



## Canine Research

## What is a dog bite? Perceptions of UK dog bite victims

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## ABSTRACT

Dog bites are frequently reported in the media, hospital and other official data, and scientific literature. But what exactly constitutes a dog bite? Most dog bites reported through hospital admissions are likely to result in a relatively severe injury, but many more dog bites go unreported. Dog bites are rarely defined and little research has investigated what people mean by “dog bite”, especially in light of frequently used language such as “nip” and “play bite”. A better understanding of common definitions of dog bites is necessary if they are to be studied effectively. This study aimed to identify bite victim perceptions of what they deemed to be a dog bite, including the influence of factors related to the severity of the incident, and the dog’s behavior and supposed intention. UK adult self-reporting dog bite victims (n=484) were surveyed. A range of factors affected whether or not an incident was considered to be a dog bite. For example, there was disagreement regarding whether an event where the dog’s teeth only made contact with a person’s clothing counted as a bite; consensus on a bite was only reached (81% stated “Yes”) if the teeth made skin contact and resulted in bruising, with or without skin puncture. Furthermore, opinions differed according to the perceived intention of the dog, for example, if the bite occurred during play, 45% agreed/strongly agreed and 37% disagreed/strongly disagreed that it would not be considered a bite. By contrast, if a dog did not intend to bite a person, then 41% agreed/strongly agreed and 42% disagreed/strongly disagreed that it would not be called a bite. These findings highlight the need for clear definitions as to what is being studied within research projects, especially when studying common but less serious dog bites.

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## Introduction

Dog bites are a common and serious public health issue, both within the UK and worldwide (Morgan and Palmer, 2007; World Health Organisation [WHO], 2013). Dog bites can have physical (e.g., severe injury resulting in surgery [Mannion and Graham 2016], rabies [Rock et al., 2017]), and psychological effects (e.g., posttraumatic stress disorder)/cynophobia (Peters et al., 2004; Westgarth and Watkins, 2017), as well as negative welfare implications for the dog involved (e.g., a dog may be muzzled, rehomed, or even euthanized as a result of a dog bite [Oxley et al., 2018]).

Identifying what is and what is not considered as a dog bite is important from a public health point of view to provide clear case

definitions. Without this, it is difficult to assess if dog bites are increasing, what factors are associated with dog bite risk, or design and measure effective dog bite prevention interventions. Furthermore, without such definitions and assessment criteria, accurate information regarding the occurrence of a dog bite and the degree of injury could be prone to misclassification bias (Amonette et al. 2016, p126). If the definition of a dog bite used within a study is narrow, important injuries and common bite contexts may not be included. Conversely, if a very broad definition is used, bites with great variation in context and underlying motive may be included.

The definition of dog bites used in a study is likely to be dependent on the aim and context of the research. Researchers interested in bites at the population level may use a broad definition compared with contexts such as hospitals, where the focus is on injuries that involve the skin being broken, but may be less concerned about the bite context. For example, Beck and Jones (1985) stated that health officials generally refer to an animal bite as any break in the skin by teeth regardless of context/behavior. This

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definition may be more applicable to a hospital context but not be applicable to many dog bites which go unreported and do not require medical attention (Sacks et al. 1996). A lack of clear definition can result in reported statistics which are difficult to interpret and compare and/or may not reflect the true incidence. In the UK, the Health and Social Care Information Centre noted that between March 2014 and February 2015, 7,227 patients were admitted to hospital as a result of being “bitten or struck by a dog” (HSCIC, 2015). In addition to not defining what a dog bite is, this definition does not allow for discrimination between striking and biting (Orritt, 2014); the definition of “strike” is elusive but supposedly is a “catch all” for other direct injuries caused by a dog (e.g., being pulled over by the dog while walking, Willmott et al. 2012).

Furthermore, past research into risk factors has used varied definitions of dog bites (and frequently may not provide a definition at all). For example, Lunney et al. (2011) conducted a census in a community and asked if people had been previously bitten by a dog but did not define a bite; this was left to individual victims to determine. More recently, Westgarth et al., (2018) conducted a cross-sectional survey of a community within the UK and asked if the respondent had been previously bitten without providing the definition of a bite. By contrast, Guy et al. (2001) conducted telephone interviews with dog owners who attended veterinary practices and clearly defined a bite for the purposes of their study as “the upper or lower teeth making contact with the victim’s skin with sufficient pressure to cause a visible injury such as an indentation, welt, scrape, bruise, puncture, or tear in the skin. A dog mouthing a person’s skin without applying sudden pressure is not considered a bite”. Similarly, Cornelissen and Hopster (2010) conducted an internet survey of people who had been bitten and used detailed criteria ranging from no injuries, to minor injuries, through to severe injuries.

It is important to note here that dog bites are likely to occur in a range of circumstances and are not necessarily as a result of dog aggression due to fearful or nervousness, as generally focused on within dog bite prevention programs (Westgarth and Watkins, 2015). Therefore, an issue for consideration is the context in which bites occurred and the perceived behavior and intention of the dog. For example, Beck and Jones (1985) did not include bites which occurred during play, whereas Cornelissen and Hopster (2010) included bites occurring during play within the category of “unintentional dog bites”. Other terms such as “nip”, “mouthing,” or “play biting” in dogs are frequently used and may be associated with a specific type of behavior (e.g., play) or age group (e.g., puppies [Messam et al., 2013]). But these terms lack definition and may be used interchangeably. Furthermore, the contexts of these bites are rarely referred to in dog bite prevention literature or risk factor studies, even though they may still result in injury. Westgarth and Watkins (2015) conducted qualitative interviews of dog bite victims and highlighted the effect on bite definition of differing opinions regarding the perceived intention by the dog. For some people, bites which occurred during play were not counted as “real” bites, whereas others stated that it was a bite regardless of whether or not the dog was playing. Some participants even contradicted themselves during the interview, giving different definitions of a dog bite when speaking about different events.

In summary, there has been little research into perceptions of what is considered to be a bite and if these definitions vary between people. Therefore, the aim of this study was to investigate quantitatively how self-identified dog bite victims define dog bite incidents, based on two sets of predefined statements focusing on the definition of the bite in relation to i) the level of contact by the dog and ii) the dog’s behavior, the victim’s relationship to dog and perceived intention of the dog.

## Method

Data collection for this study has been described in full elsewhere (Oxley et al., 2018). In brief, a link to an online questionnaire, distributed through social media, sought to recruit people “who had previously been bitten by a dog, lived within the UK, and were at least 18 years old”. When answering questions, participants were asked to refer to the most recent dog bite they received. Information collected included victim demographics (e.g., victim’s age, gender, education, employment sector/status, dog ownership experience, and currently working with dogs), dog information (e.g., breed, sex, size) and surrounding factors (e.g., was the victim alone, location of the bite, and behavior of the dog before the bite). In addition, participants were asked to examine a set of statements (see Table 1) describing dog-related events and indicate whether (yes/no) they would consider each to be a dog bite. These descriptions were from a dog bite classification system proposed by Ian Dunbar (APDT, n.d.). Further analysis was conducted highlighting the respondents’ first agreement to a statement and the cumulative total (see Table 1, column “Yes to first statement”). To clarify, 13 of the 410 respondents thought that statement 1a constituted a dog bite. One hundred seventy one of the 410 respondents thought that statement 1b constituted a dog bite, but that 1a did not. Similarly, 76 of the 410 respondents thought that statement 1c constituted a dog bite, but that 1a and 1b did not, and so on. Participants were also asked to consider a number of statements (see Table 2), based on findings from qualitative interviews (Westgarth and Watkins, 2015), describing dog injury based on behavior, intention, and relationship with the dog and indicate, on a five-point scale (strongly agree to strongly disagree), the extent to which they agreed with the statement.

Chi-square tests were used to test associations between participants who agreed/strongly agreed, disagreed/strongly disagreed, or stated neither agree/disagree with statements, with demographic variables including age, previous dog ownership, and working with dogs in current profession. To explore associations further, odds ratio (OR) and confidence intervals (CIs) were calculated using binary logistic regression and presented. Data were analyzed in SPSS 17.0 for Windows (SPSS Inc., Chicago, IL).

## Results

In total, 484 responses were received. The majority (88.9%) lived in England, particularly in the North West (27.5%) and South East (22.1%). Respondents were mostly female (84.8%) and the most commonly reported current age groups were 45–54 years (24.9%) and 35–44 years (24.4%) with remaining being 18–24 years (10.9%), 25–34 (21.3%), 55–65 years (15.2%), 65–75 years (2.7%), and >75 years (0.7%). Most respondents (74.6%) worked full time. Most respondents stated they had either currently (82.6%) or previously owned a dog (87.7%). Over half (54.3%) of respondents did not come into contact with dogs as part of their profession. Regarding the most recent dog bite incident, 86% stated they were bitten only once. Refer the study by Oxley et al. (2018) for further description of the participant demographic data.

### Dog bite definition and statements

Responses to definitions of a dog bite are presented in Table 1. Almost half (46%) of respondents indicated that they would call it a dog bite if the dog only made contact with clothing (see Table 1; statement 1b). If an incident involved “Skin contact by teeth but no skin puncture or bruising” (statement 1c), 62.8% stated that they would define this as a bite. There was a significant association ( $\chi^2 = 6.792$ ;  $df = 1$ ;  $P = 0.009$ ) between historical dog owner status and

**Table 1**  
Respondents' agreement to individual statements and respondents' first agreement to a statement (n = 410) (statements, except 1b, from APDT, n.d.)

Statements	Completed responses per statement	Yes (N)	Yes (%)	95% CI	"Yes to first statement" (N)	"Yes to first statement" (%)	Cumulative total
1a. Obnoxious or aggressive behavior but no contact by teeth	382	13	3.4	1.8–5.7	13	3.2	13
1b. Dog only made contact with clothing	393	179	45.5	40.5–50.6	171	41.7	184
1c. Skin contact by teeth but no skin puncture or bruising	392	246	62.8	57.8–67.6	76	18.5	260
1d. Skin contact by teeth and bruising but no skin puncture	396	322	81.3	77.1–85.0	80	19.5	340
1e. One to four punctures from a single bite with no puncture deeper than half the length of the dog's canine teeth	402	367	91.3	87.6–93.5	54	13.2	394
1f. One to four punctures from a single bite with at least one puncture deeper than half the length of the dog's canine teeth	395	359	90.9	87.6–93.5	12	2.9	406
1g. Multiple bite incident with at least two deep bites	397	350	88.2	84.6–91.2	4	1.0	410

definition 1c ("Skin contact by teeth but no skin puncture or bruising"), as those respondents who had previously owned a dog were significantly less likely to agree that statement 1c was a bite (OR = 0.4; 95% CI 0.2–0.8;  $P=0.011$ ). Most respondents stated that they would define statement 1d, 1e, 1f, and 1g as a dog bite, thus if at least bruising occurred.

Reported definition statements per participant were also compared with the definitions given for their previously reported most recent bite (Oxley et al. 2018, Table 6) for validity. Of the 343 respondents that completed both questions, 330 (96.2%) reported bites that were valid within their own definitions of a dog bite. Only 13 (3.8%) respondents reported bites that were not concurrent with their own definitions (i.e., the bite reported on was of a lesser severity than their minimum severity for a bite, as defined by the criteria in Table 1).

Responses to statements regarding the context and response to dog bites are presented in Table 2. Respondents were divided as to whether a dog bite during play would not be regarded as a "real" dog bite (Table 2; statement 2b) with 45.1% strongly agreeing/agreeing and 36.9% disagreeing/strongly disagreeing. There was some evidence of a possible association between statement 2b and if an individual had previously owned dogs ( $\chi^2 = 10.993$ ;  $df = 1$ ;  $P=0.06$ ). Furthermore, a significant association was found between statement 2b and if individuals came into contact with dogs as part of their profession ( $\chi^2 = 7.822$ ;  $df = 2$ ;  $P = 0.020$ ). Those who did come into contact with dogs as part of their profession were significantly more likely to agree/strongly agree with statement 2b (OR = 1.805; 95% CI = 1.1–2.7;  $P = 0.06$ ) compared with those who did not.

Whether the dog was felt to have intended to bite the victim also divided opinion, as 40.7% strongly agreed or agreed with the statement "If a dog did not intend to bite me I would not call it a dog

bite" (statement 2c), whereas 41.5% disagreed or strongly disagreed. There was a significant association between the participant's current age group and agreement or disagreement ( $\chi^2 = 17.662$ ;  $df = 6$ ;  $P = 0.007$ ), as those aged 25–34 years (28.8%; 49/170) and 35–44 years (26.5%; 45/170) were more likely to disagree with the statement "If a dog did not intend to bite me I would not call it a dog bite" and those aged 45–54 years (31.5%; 53/168) were more likely to agree with this statement. However, specific age categories were equally as likely to agree as to disagree with the statement, including 18–24 years (SA/A [19] and D/SD [19]) and 65 to >75 years (SA/A [6] and D/SD [6]). Most respondents disagreed with statement 2d "I would be unlikely to seek medical attention for a dog bite if the dog belonged to a friend or family member" (60.9%) and 2e "I would be unlikely to seek medical attention for a dog bite if the dog belonged to me" (57.1%).

## Discussion

To effectively measure and prevent dog bites, it is important to understand how such injuries are perceived and how definitions of dog bites vary between individuals. This research highlights the varying opinions on what can be considered a dog bite. While relatively strong consensus was evident with increasing injury severity, including at least clear bruising or skin puncture, definitions were more contentious where no injury occurred or injuries were mild.

There was disagreement among respondents as to whether dog bite statements that occurred without intention or during play were bites. This is consistent with previous research by Westgarth and Watkins (2015) that also found disagreement among dog bite victims surrounding their interpretation of the bite in relation to

**Table 2**  
Victims' responses to dog bite definition statements

Statements	SA*	A	Neither	D	SD	Total
2a. "I would only call it a dog bite if a dog was acting aggressively"	11.4% (47)	18.9% (78)	10.9% (45)	42.0% (173)	16.7% (69)	412
2b. "If a bite occurred whilst a dog was playing it would not be a real dog bite"	15.1% (62)	30.0% (123)	17.7% (74)	29.8% (122)	7.1% (29)	410
2c. "If a dog did not intend to bite me I would not call it a dog bite"	13.8% (57)	26.9% (111)	17.7% (73)	34.5% (142)	7.0% (29)	412
2d. "I would be unlikely to seek medical attention for a dog bite if the dog belonged to a friend or family member"	6.1% (25)	12.9% (53)	20.1% (83)	45.1% (186)	15.8% (65)	412
2e. "I would be unlikely to seek medical attention for a dog bite if the dog belonged to me"	8.8% (36)	15.1% (62)	19.0% (78)	41.5% (170)	15.6% (64)	410

\* SA, strongly agree, A, agree, D, disagree, SD, strongly disagree.

the dog's perceived intention or where it was playing. Furthermore, Tami and Gallagher (2009) asked individuals with different levels of dog-related experience (e.g., nonowners, dog owners, dog trainers, and vets) to classify different dog behaviors based on YouTube videos. They found that although respondents did agree on some behaviors (e.g., fear), participants did not agree on classification of other behaviors including aggression and play regardless of experience. More recently, Jacobs et al. (2017) found that dog owners were able to identify obvious signs of aggression (e.g., biting, snapping), based on online videos, but were less able to identify subtle signs (e.g., growling, freezing, body tension) of aggression.

In the present study, previous dog ownership was found to have an effect on dog bite definitions. Respondents with dog ownership experience were less likely to agree, compared with nonowners, that it would be defined as a dog bite if contact with the skin was made but no bruising or skin puncture occurred. Dog owners were also more likely to agree that a bite during play was not deemed a "real" dog bite. This may be due to dog owners being more used to, or to have "normalized", dog mouthing or play biting. These findings highlight the importance of perceived intention of the dog involved and its role in defining a dog bite (Westgarth and Watkins 2015). In addition, definitions may be influenced by the relationship with the dog involved as owners may be more sympathetic or lenient to their own dog, or a dog that they know well, and so less likely to interpret the dog's actions negatively (Rajecki et al., 1998). Interestingly, the current age of the respondent appeared to have a bearing on whether they agreed or disagreed with the statement (2c) related to the intention of the dog and whether it would be deemed a dog bite. This area could be further explored to understand if it relates to greater dog-related experience or other factors.

Wright (1990) reviewed human dog bite reports from both stray and owned dogs and suggests that victims bitten by owned dogs may be less likely to report a bite due to embarrassment (e.g., bitten by their own dog) or concern that it may negatively affect human relations (e.g., with neighbors, family, and/or the dogs owners). This could also be the case for seeking medical treatment, as in the present study, 23.9% and 19.0% of respondents reported that they agreed with the statement suggesting that they would be less likely to seek medical attention if bitten by their own dog or a friends/family members' dog, respectively. However, the majority disagreed with the statement and felt they would seek medical attention. Further research to gather views on the likelihood of seeking medical attention if bitten by an unfamiliar dog would be useful. It is possible that respondents may act differently during an actual dog bite event to what they hypothetically say they would do. Further research would be useful to investigate how the relationship between the bite victim and dog owner may affect the likelihood of reporting dog bite and/or seeking medical treatment.

There are several limitations to this study, including the method of survey distribution being via social media, which has been found to potentially result in selection bias (e.g., self-selection and under coverage bias [Bethlehem, 2010]) and may account for the over-representation of female and dog-owning respondents. An individual's definition of what is and what is not a dog bite may have also influenced whether they completed the questionnaire as some may not have perceived specific contexts as a dog bite (e.g., during play). This survey only sought respondents from the UK and therefore the results may not be representative of other geographical regions.

The bite definition statements (Table 1), apart from statement 1b, were from pre-published bite scales (APDT, n.d.) but may be an area which also could be improved. For example, statement 1c states skin contact with teeth but does not explicitly infer a situation where a bite occurs through clothing and still causes a wound, even though there was no direct skin to teeth contact. In addition,

11.8%, 9.1%, and 8.7% of respondents stated they did not classify statements 1e, 1f, and 1g (Table 1.) as a dog bite, respectively, despite these being the highest injury severity statements described. This highlights the potential of inaccurate completion of this question by a small number of respondents as it appears that respondents may have thought that only one statement could be chosen. Although, it should be highlighted that after each statement, the instruction "indicate for each statement" was provided.

In summary, minor incidents in particular may be inconsistently defined as dog bites and hence have the potential for considerable subjective interpretation, especially in relation to behaviors that may be deemed not directly aggressive, such as play or where intention is unclear. Further research is required to investigate how and why the definition of dog bites varies between people and contexts. In addition, researchers, health care staff, and data auditors should clearly define what they do and do not mean when investigating and describing dog bites, including in terms of the degree of contact/injury and the context and perceived intention of the dog. The needs of case definition for research may vary depending on the study particulars, but in general, we would recommend that for most public health research purposes, a dog bite be defined as that causing at least bruising or skin puncture and regardless of perceived intention of the dog.

### Conflict of interest

The authors declare no conflict of interest.

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