

# Evaluation of the syndromic characterization and diagnostic criteria of the concept of anxiety in animal ethology professionals

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**Abstract:** There is a wide range of reported signs for anxious patients in veterinary medicine but specific diagnostic criteria to characterize them is lacking. The objective of this study was to determine the variability in the concepts of anxiety and the criteria used to diagnose anxiety disorders in veterinary medicine. A questionnaire was developed to obtain information through direct responses from 31 professionals in the exercise of clinical ethology with questions based on the subject of canine anxiety (definition, manifestations, and diagnosis). An analysis was performed using contingency tables. Seventy-three percent (73%, n=22) of respondents agreed on one definition. The signs most frequently considered in the diagnosis of this disorder were increased vigilance (90.3%, n=28), increased motor activity (87%, n=27), panting, and altered heart rate (bradycardia/tachycardia) (77.4%, n=24). From these results, homogeneity is observed in the concept of anxiety, but with evidence of diagnostic heterogeneity, which can be related to the wide repertoire of signs that are considered in the questionnaire and are present in dogs, as well as the lack of diagnostic criteria and/or tests that can objectively evaluate each patient in order to obtain more uniform and reliable results.

**Keywords:** canine anxiety; dog behavior; animal behavior, behavioral medicine, animal welfare, veterinary behavior

## HIGHLIGHTS

- Currently there are no specific diagnostic standards found in literature that can help characterize and diagnose dogs with anxiety disorders
- Most behavioral professionals selected clinical signs that are usually more evident in the patients and especially those that can be observed during the consultation
- This study found homogeneity in the concept of anxiety, but great variability in the components of the anxiety disorder that are considered for diagnosis

## INTRODUCTION

Anxiety is a basic emotion arising since infancy which helps us adapt to a probable danger, meaning it is not specifically pathological (Beesdo-Baum & Knappe, 2012). Psychologists and psychiatrists define anxiety as an emotion of threat or apprehension of what may happen in the future, which the individual perceives as uncontrollable and unpredictable, with a long-lasting response (Antony & Swinson, 2014; Sah, 2017).

In contrast, Barlow (Barlow, 2000) defines it as a state of impotence due to a perceived inability to predict, control, or obtain the desired results in certain outstanding situations or contexts in the future.

This emotion can be maladaptive and pathological when presented persistently or for long periods of time, associated with mental anguish or deterioration (American Psychiatric Association & American Psychiatric Association, 2000). In humans, there are a variety of anxiety disorders, including generalized anxiety disorder, panic disorder, post-traumatic stress disorder, and social affective disorder (Sah, 2017).

In psychiatry, the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) defines anxiety as the presence of two or more of the following symptoms: feeling nervousness or tension, unusual restlessness, difficulty concentrating due to worry, fear of terrible things happening, and individuals feeling losing control of themselves (American Psychiatric Association, 2014). To avoid over-diagnosing anxiety disorders in pediatric patients, the criteria was widened to include a minimum presentation time of anxiety symptoms, stating these must be present for at least six months (Tayeh et al., 2016).

In veterinary medicine, Landsberg et al (Landsberg et al., 2013), Ogata (Ogata, 2016), and Overall (Overall, 2013) define anxiety as an emotion of apprehension in the face of an anticipated danger or threat. Signs are recognized through physiological responses (e.g., autonomic activation, increased heart and respiratory rates, tremors, salivation, gastrointestinal alterations), and behavioral responses (e.g., paralysis, lip licking, yawning, wandering, vocalization, hypervigilance, and restlessness); however, the anxiety-triggering stimulus is not often identified.

In order to diagnose anxiety disorders, Overall (Overall, 2013) mentions that both neurophysiological (tachycardia, blood pressure alterations, mydriasis, vasodilatation, salivation, muscular tension, etc.) and behavioral (increased vigilance, exploration, motor activity, aggression, etc.) markers must be considered. There is a wide range of signs reported in patients suffering from anxiety disorders, yet no specific diagnostic criteria to characterize patients with this disorder were found at the time of this research. Therefore, it is likely that physicians dedicated to the area of clinical ethology have a heterogeneous concept of anxiety, its manifestations, and its diagnostic criteria.

The objective of this study was to determine the variability in the concepts of anxiety and the criteria used to diagnose anxiety disorder in dogs.



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## MATERIAL AND METHODS

### *Participants*

A questionnaire was sent electronically to 130 veterinarians, researchers in animal psychology/behavior or animal science, and biologists dedicated to the area of clinical ethology. This larger sample size was considered because a significant non-responsiveness was expected given the way the questionnaire was applied. Approximately between one third and one fourth of participants were expected to reply. Any number over 30 respondents would ensure the possibility of making inferences about the variables studied.

The participants' data were obtained through webpages of associations and institutions of veterinary ethology professionals worldwide: Animal Behavior Society (ABS) ([www.animalbehaviorsociety.org](http://www.animalbehaviorsociety.org)), European Board of Veterinary Specialization (EBVS) (<https://ebvs.eu/>), American College of Veterinary Behaviorists (ACVB) ([www.dacvb.org/](http://www.dacvb.org/)), School of Veterinary Medicine and Animal Zootechnics - Department of Ethology, Wildlife and Laboratory Animals UNAM (<http://www.fmvz.unam.mx>) and, LinkedIn ([linkedin.com](https://www.linkedin.com)). This last webpage was considered since it displays users' information and work experience, after performing a search for veterinarians practicing clinical ethology.

### *Questionnaire*

The instrument used to obtain information was specifically designed for use in the present study under the Google® Forms platform. This questionnaire compiled conceptual information and criteria used by clinical ethologists to diagnose anxiety disorders in dogs. It contained questions related to the definition of anxiety and its diagnostic characterization. The questions were answered using a combination of checkboxes, multiple choice, and short answers. The first part of the questionnaire focused on the participants' general information (gender, country, profession, current occupation, place of professional practice, time working in clinical ethology) and the number of cases they attend per year. The second part was based on the subject of anxiety (definition, manifestations, and diagnosis).

The questionnaire is comprised of 13 multiple-choice and checkbox questions, four of which included the option to choose "other" and input the response in the respondents' own words, and one open question to include techniques used to characterize anxiety. The questionnaire was sent 130 times and was created based off the information currently available regarding anxiety in dogs. A qualitative validation was performed, defining the concepts to be measured and refining the questions through expert judges, but evaluating the internal consistency of the instrument was impossible.

### *Statistical analysis*

The information obtained in the present study was evaluated using means of analysis for contingency tables and obtaining association measures for the



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variables of years of experience and number of cases attended against each one of the signs considered by the respondents (Seoane et al., 2007).

## RESULTS

Thirty-two responses were obtained, although one of them was discarded because 80% of the questionnaire had not been answered. Of the 31 remaining questionnaires, 65% (N = 20) were answered by women and 35% (N = 11) by men. According to the country of origin, 26% (N = 8) were from the United States of America, 19% (N = 6) from Mexico, 13% (N = 4) from Spain, and another 13% from Italy; other countries represented were Belgium, Argentina, Brazil, Chile, France, and The Netherlands. Most of the participants were veterinarians (91%, N = 28), the rest were biologists, researchers, and animal science professionals.

According to their experience, most of the participants had been working in ethology between 11 and 15 years (23%, N = 7), between 6 to 10 years (22%, N = 7), between 16 and 20 years (16%, N = 5), and more than 30 years (16%, N = 5) (Figure 1).

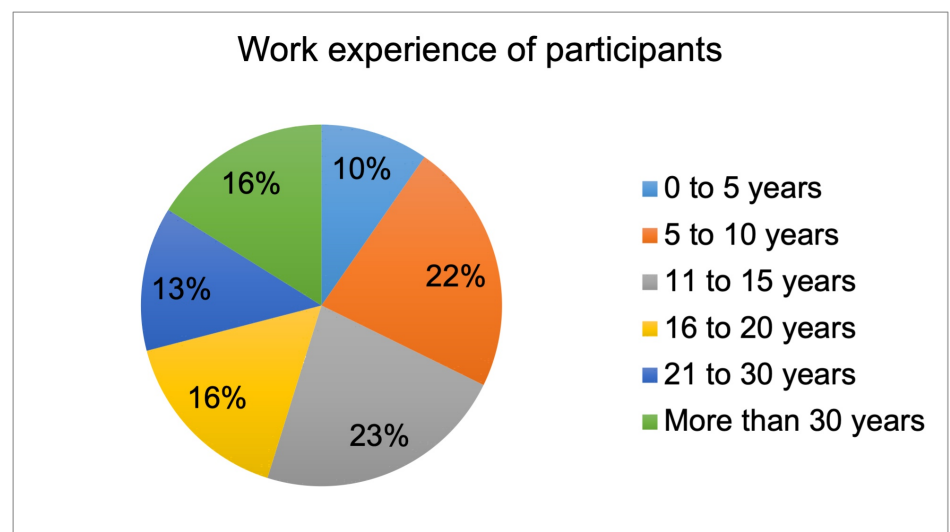


Figure 1. Participants' work experience in the area of Clinical Ethology



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The definition of anxiety included in the questionnaire that the highest percentage of respondents (73.3%, N = 22,  $P < 0.01$ ) agreed with was "it is an emotion of threat or apprehension of what may happen in the future, which the individual perceives as uncontrollable, unpredictable, and with a lasting response" (Figure 2).

Regarding the signs that characterize an anxiety disorder, 29% (N = 9) associated 16 to 20 signs, 26% (N = 8) associated 11 to 15 signs, and 22% (N = 7) selected more than 20 signs.

Based on the participants' responses, the signs most associated with an anxious

state were increased vigilance (90.3%, N = 28), increased motor activity (87%, N = 27), panting, and altered heart rate (bradycardia/tachycardia) with 77.4% (N = 24) each (Figure 3).

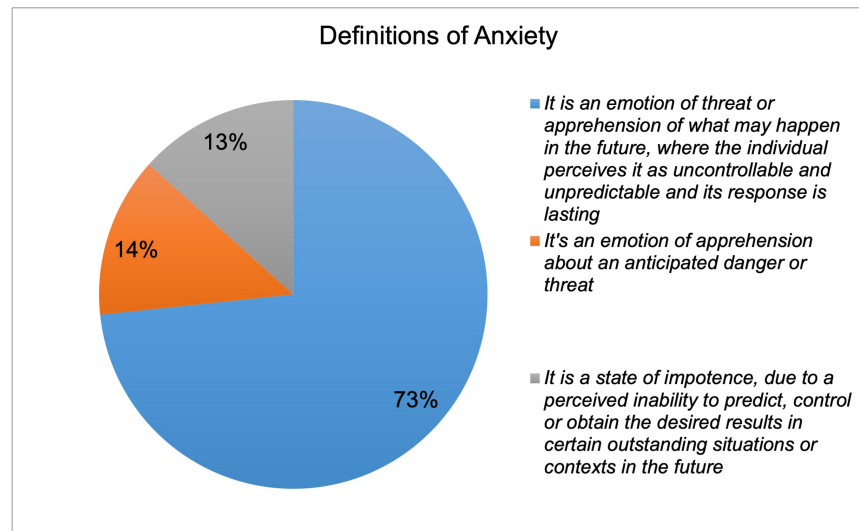


Figure 2. Most accurate definitions of anxiety in the area of clinical ethology as selected by the respondents

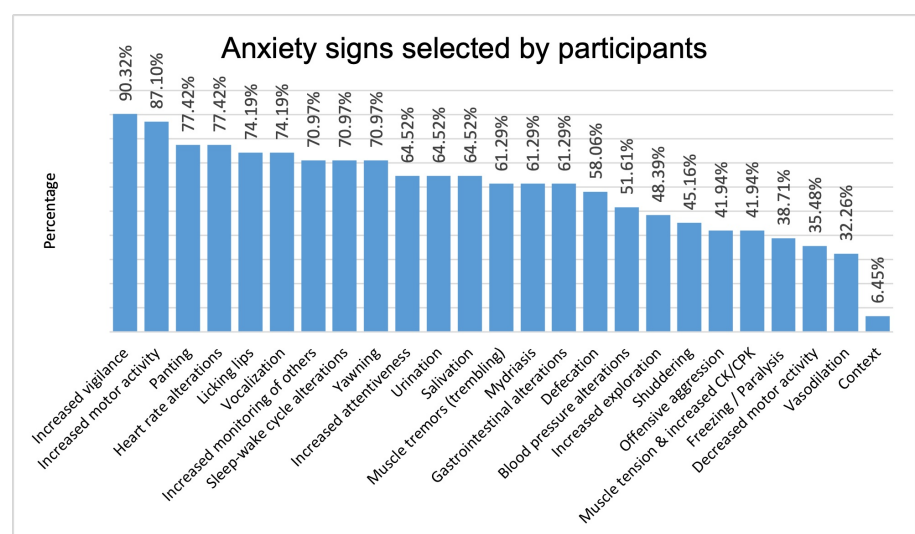


Figure 3. Associated anxiety signs that were mentioned by the participants



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All questions but one was multiple-choice, including the signs seen in Figure 3. Since some concepts may seem similar, the definitions are provided. For instance, increased vigilance refers to the patient evaluating their environment in order to perceive any threats (Robinette & Ha, 2001), which can be expressed as a heightened response if the patient is touched or interrupted. On the other hand, increased scanning means the patient moves their eyes or head to constantly scan any activities going around in their environment (Hammerle et al., 2015).

Based on the question related to the number of signs, a patient must present in order to be suffering from an anxiety disorder, 47% (N = 14) answered that patients must present between 1 and 5 signs, while 40% (N = 12) replied that the number of signs is not relevant.

When asked what their diagnostic criteria were, 80% (N = 24) responded that they did not use a test to characterize anxiety disorders, and only 20% (N = 6) responded that they did use tests. Some tests included for diagnosing anxiety disorders were the exit test for separation anxiety, ignoring the patient for 30 minutes during the consultation, the EDED scale (Evaluation of a Dog's Emotional Disorder), validated questionnaires (such as noise fears/phobias), and a brief exposure to potentially threatening stimuli (always in the presence of the owner).

Lastly, two significant associations were found: one between the participants' experience in the area of clinical ethology (6 to 10 years, 11 to 15 years) and two signs: increased exploration ( $P = 0.008$ ), and shuddering ( $P = 0.018$ ). The other: between the number of patients per year (1-200) and 2 signs: increased exploration ( $P = 0.05$ ) and urination ( $P = 0.08$ ).

## DISCUSSION

The definition most selected by the respondents was "(anxiety) is an emotion of threat or apprehension of what may happen in the future, which the individual perceives as uncontrollable, unpredictable, and with a lasting response." This definition was built from three other similar definitions proposed by three veterinary behaviorists (Landsberg et al., 2013; Ogata, 2016; Overall, 2013). Therefore, this can be associated to a term mostly known in the area of ethology with more frequent uses within the professional practice. Based on the results, the hypothesis that there would be heterogeneity in selecting a definition for anxiety is discarded since most of the participants were inclined towards the same definition, although these results are not conclusive, and it cannot be said that there is a consensus.

Regarding the question related to the signs that characterize an anxiety disorder, most of the respondents considered between 16 and 20 signs, followed by 11 to 15 signs, and more than 20 signs ranked third place in their selection. Since these are high numbers, it is clear that there are many manifestations considered by the participants, leading to heterogeneity in establishing the probable diagnosis of a patient suffering from an anxiety disorder.



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Mendoza (Mendoza, 2011) characterized behavioral alterations in 125 dogs diagnosed with Generalized Anxiety Disorder (GAD), finding muscle tension (76.80%), aggressiveness (66.40%), gastrointestinal problems (vomiting, diarrhea, chronic gastritis, etc.) (36.80%), hyperactivity (wandering, problems staying still, inability to relax) (32.80%), hyper-vigilance (20.80%), and with sleep problems (non- continuous sleep, wakes up easily, has no naps during the day) (16.80%). In the present study, increased vigilance, increased motor activity, wheezing, altered heart rate (bradycardia/tachycardia), lip licking, vocalization, increased monitoring of other individuals' actions, yawning, and sleep disturbance were selected more frequently by participants, so it can be observed that the participants selected signs that are usually more evident in the patients and especially observed during the consultation. It should be noted that Mendoza studied generalized anxiety disorder so it would be expected that clinicians had selected the signs with the same percentage of their presentation.

On the other hand, Storengen and collaborators (Storengen et al., 2014) conducted a study with dogs diagnosed with separation anxiety disorder (n=215) in which their owners reported the signs they observed most frequently. These signs were: vocalization (83.2%, n=163), destruction (36.4%, n=71) and excessive motor activity (26.2%, n=51). Destruction, despite existing in an anxiety disorder, was not mentioned by the questionnaire respondents, which could be associated to the fact that this sign usually appears only in patients with separation anxiety and no other types of anxiety disorders. However, both vocalization and excessive motor activity were also selected more frequently in the present study, which could be related to these two signs being more easily observed by the clinician.

Based on the number of signs a patient must present to be suffering from an anxiety disorder, most responded that they use between 1 and 5 signs, a smaller range. Mendoza (Mendoza, 2011) focused only on 6 signs proposed by the Diagnostic and Statistical Manual of Mental Disorders (DSM) and the International Classification of Diseases and found that 58% of patients presented 0 to 2 signs, and 37% presented between 3 and 5. An important point to highlight from this article is the question of how a patient with generalized anxiety disorder could be diagnosed with 0 to 2 signs, when the DSM mentions that adult patients must present three or more out of six signs of anxiety to be diagnosed, and at least one sign for the diagnosis of children. Furthermore, if the patient presented no signs, it would mean that the patient could be diagnosed with GAD when there is no evidence of any signs pointing to this disorder.

Most respondents answered that they do not use complementary diagnostic tests to characterize anxiety; this result can be related to the fact that several of the respondents were from the same country, and they could have received training or education from the same source. All this could be associated with the diagnostic differences that may exist between graduates from the American College of Veterinary Behavior (DACVB) and the European College of Animal Welfare and Behavioral Medicine (ECAWBM) (Martin et al., 2014), but there was no significant association between these variables.



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Only 20% (n=6) of the respondents mentioned that they use tests to evaluate a patient as suffering from an anxiety disorder, such as the exit test for separation anxiety; ignoring the patient for 30 minutes during consultation; the EDED (Evaluation of a Dog's Emotional Disorder) scale; validated questionnaires (noise fear/phobia); and brief exposure to potentially threatening stimuli always in the presence of the owner. Unfortunately, such tests have not been evaluated and validated for objective use in the area of clinical ethology.

Even though both the research and practice of veterinary behavioral medicine has grown significantly in the past 20 years, this field still lacks standardized protocols for the adequate diagnosis of different behavioral problems frequently reported by pet owners (de Assis et al., 2020). Due to the aforementioned, and with patients showing a significant variability in the number and types of signs presented, there is no clarity regarding specific signs or groups of signs that may be commonly found in patients with anxiety disorder.

Results obtained in this study suggest some heterogeneity when characterizing a patient suffering from an anxiety disorder. This could be related to the wide array of signs selected in the questionnaire that can be present in dogs presenting anxiety. This heterogeneity highlights the lack of tests and/or criteria that could be used to objectively evaluate each patient, thus obtaining more uniform and reliable results.

## CONCLUSIONS

This study found homogeneity regarding the definition of anxiety, which could be a useful start for clinical ethologists to define a patient as suffering from an anxiety disorder and have a basis to make a diagnosis.

Some signs were selected more frequently by clinicians: increased vigilance, increased motor activity, and panting. Despite the consensus in the definition of anxiety and some of its signs, other results obtained in this study suggest a heterogeneity in the way of characterizing a patient with anxiety disorder. There are no standardized tests or parameters for the diagnosis of anxiety disorders in dogs, so further research is needed to develop specific criteria to diagnose patients objectively.

It is important to conduct subsequent studies in order to characterize an anxiety disorder in patients among all clinical ethologists, to investigate why tests are not currently being used to help guide or confirm a diagnosis of anxiety disorder in dogs, and to build a universal definition and signalment for anxiety in the area of animal behavior. Given the sample size in this study, the results must be interpreted with caution.



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