



# Measuring fear in dogs by questionnaires: An exploratory study toward a standardized inventory



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## ABSTRACT

Several types of questionnaires are in use to measure fear-related behaviour in family dogs. Our aim was to develop a general questionnaire based on relevant previous studies in order to facilitate the standardization of measurements of fear-related behaviour in dogs (social fear, non-social fear, separation problems, anxiety/destructiveness and neuroticism). We investigated which aspects of fear do emerge as distinct factors when measuring fear in dogs with our consensus questionnaire.

We developed the questionnaire by piercing together seven discrete fear-related factors from six previous studies representing different aspects of fear. Our final questionnaire consisted of 56 items and was filled out by 833 Hungarian pet dog owners.

Principal component analysis was applied to explore the factorial structure of the questionnaire scores. The original seven factors used in developing the questionnaire did not emerge as discrete factors. Instead, we found four factors (33 questionnaire items) labeled as neuroticism (CRA = 0.87), dog-directed fear (CRA = 0.84), human-directed fear (CRA = 0.90) and separation-related behavior (CRA = 0.83).

The effects of demographic and dog keeping characteristics on these factors were also tested by generalized linear models (GLMs). For example, toy dogs had a higher risk to show neuroticism and dog-directed fear. Female owners were more frequently reporting human-directed fear in their dogs. Female dogs showed higher level of dog-directed fear. Older dogs score was higher on neuroticism and neuroticism correlated with the time of acquisition.

The standardization of specific trait measures provides an advantage to the researchers in constructing further, more specific tools and offers a greater comparability of research across dog and human populations.

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## 1. Introduction

Over the past 30 years, a variety of studies have been conducted in order to characterize the individual behaviour

of dogs across contexts and over time (e.g. Hsu and Serpell, 2003; Gosling et al., 2003; Jones and Gosling, 2005; Turcsán et al., 2012). Currently we are far from understanding the whole structure of dog personality traits, however some aspects of the dogs' consistent individual behaviour seems to show some generality as they come up repeatedly across studies (e.g. those related to sociability, activity or fear, Jones and Gosling, 2005). However, even studies focusing on the same trait are highly diverse in terms of methodological design and terminology which makes comparison between them difficult. The need for transparency

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and standardization in methodological design has already become a pressing issue in behavioural sciences (Diederich and Giffroy, 2006.) The overall goal of the present work is to take a step forward in this direction.

Jones and Gosling (2005) identified seven broad categories called ‘temperament dimensions’ for ordering canine personality behaviour, labelled as Reactivity, Fearfulness, Activity, Sociability, Responsiveness to training, Submissiveness, and Aggression. Trait names of the different studies can be classified in terms of the temperament dimensions (Fratkin et al., 2013). There are numerous studies analysing such traits representing a wide variety of research interest, including the focus on behaviour problems (e.g. Jagoe and Serpell, 1996), assessment of the dogs’ suitability for specific functions (e.g. guide dogs: Serpell and Hsu, 2001), estimation of heritability (e.g. Goddard and Beilharz, 1986), or determination of breed differences (e.g. Duffy et al., 2008).

We chose the fearfulness dimension as the target of our study. Fear-related behaviour emerged as an important aspect of the dogs’ personality also from applied point of view as it relates to the welfare of the animals and could have a strong influence on the owner-dog relationship (Hsu and Sun, 2010; Duffy et al., 2008; Guy et al., 2001). Therefore, developing a standard methodology to assess this dimension of behaviour could be beneficial, both practically and scientifically.

Fear is often defined as a cognitive and emotional mental state that activates defensive behaviours in response to threatening and/or painful stimuli (Cannon, 1929; Rachman, 1998; Öhman and Mineka, 2001). Fear is regarded as a biologically adaptive (evolved) mechanism that contributes to the survival of the individual by controlling its distance to the stimulus (e.g. escape/avoidance, fight/flight, immobility) (Öhman and Mineka, 2001). While fear is usually determined in relation to a particular stimulus, fearfulness is a character of an individual, and could be defined as the behavioural manifestation of fear emotion (i.e. a more fearful animal has a tendency to react stronger and more intensively to fear-evoking stimuli in general).

Jones and Gosling (2005) found traits related to the fearfulness dimension in dogs in 43 of the investigated 50 publications, thus fearfulness is considered as the most frequently emerging temperament dimension. A large number of these investigations rely on questionnaires (ratings of individual dogs) aiming to obtain information from dog owners regarding their dogs’ fear-related behaviour. In order to validate questionnaire-based fearfulness traits Gosling et al. (2003) and Jones (2008) tested how well the owners’ personality judgments of their dogs predicted the behaviour ratings obtained in a field-testing sessions or in a test battery. The authors reported strong correlations between owners’ personality judgments and the independent behaviour ratings of the field tasks.

In recent years a wide range of questionnaires have been developed for measuring fearfulness in dogs, however, without any standardization in the construction of the questionnaires or the nomenclature. The studies also differ in which types (class) of fear-related behaviour they discriminate. Some studies assess fearfulness as a general personality trait with no discrimination regarding the

source of it (e.g. Guy et al., 2001; Jones, 2008). Others investigate fear-related behaviour separately to specific type (or class) of stimuli. For example, many studies discriminate between social and non-social fear (Jagoe and Serpell, 1996), a few of them even divide the social fear into separate types (e.g. human-, and dog-directed fear, Serpell and Hsu, 2001).

The method and terminology of the studies seem to mirror the above concept. Studies of the former type usually utilize adjective-based methodology or more general short statements, for example “Dog is shy”, “Gets nervous easily”. Such traits are labelled as “apprehension” (Cattell and Korth, 1973), “timidity” (Hennessy et al., 2001; Stephen and Ledger, 2007), “calmness” (Kubinyi et al., 2009) or – drawing on human psychology – “neuroticism/emotional reactivity” (Gosling and Bonnenburg, 1998; Gosling et al., 2003; Ley et al., 2009). Studies of the later type assess “fear” by posing specific questions about the reaction of the dog to these specific “threats”, e.g. a strange human, an unfamiliar situation, or a vacuum cleaner. They usually describe everyday situations and label their traits accordingly, for example as “social fear”, “non-social-fear”, or “noise phobia” (Jagoe and Serpell, 1996; Blackwell et al., 2013).

Earlier work revealed intrinsic and extrinsic variables in association with different fear-related behavioural traits in dogs. Intrinsic variables included the dog’s breed, sex, neutering status, and age (Bennett and Rohlf, 2007; Tami et al., 2008; Blackwell et al., 2013). Extrinsic (environmental) variables such as owners’ characteristics (e.g. age, gender, previous experience with dogs: Jagoe and Serpell, 1996; Kobelt et al., 2003; Bennett and Rohlf, 2007; Kubinyi et al., 2009), keeping situation (place where the dog lives, number of dogs/children/adults in the household: Tami et al., 2008; Kubinyi et al., 2009), interaction with the owner (age at acquisition, hours spent with the dog per day, training experience: Bennett and Rohlf, 2007; Tami et al., 2008; Kubinyi et al., 2009) have all been reported to correlate with one or more aspects of the dog’s fearfulness. Some variables appeared to be specific for a sample in influencing different types of fear (e.g. the owners’ previous experience with dogs, Jagoe and Serpell, 1996; Kobelt et al., 2003; Bennett and Rohlf, 2007), still others seem to be more specific for a given type of fear (e.g. the place where the dog lives—fear of loud noises, Tami et al., 2008).

In this study our aim was to develop a questionnaire from the previous studies in order to facilitate the standardization of measurements of fear in dogs. We searched for all potentially relevant questionnaire studies and reviewed questionnaire traits (“factors”) which were designed to measure (1) fearfulness or neuroticism as a personality trait, (2) behaviours related to specific types of fears, and (3) separation-related behaviours.

Separation anxiety is a common behavioural disorder in dogs (Pageat, 1995; Voith and Borchelt, 1996; Overall, 1997) characterized by signs of destructiveness, inappropriate elimination (defecation, urination), vocalization, autonomic arousal (hyper-salivation, trembling or diarrhoea) and motor restlessness (pacing, circling, digging or excessive licking) when the dog is left alone or is separated from its attachment figure, usually its owner (McCrave, 1991; Pageat, 1995; Voith and Borchelt, 1996; Overall,

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