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Satisfaction, behavior and health problems in whippets and miniature Italian greyhounds, as reported by their caretakers

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ABSTRACT

Given the relative scarcity of research focusing on non-rescue sighthound behavior, the present exploratory study aimed to investigate the presence of, and factors associated with, behavioral complaints and owner satisfaction in Italian greyhounds and whippets, using an online questionnaire. Some other behavioral characteristics (such as being challenging, gentle, or reliable), deemed likely to be important for satisfaction and/or cited in the breed standards, were likewise analyzed, and possible predictors of owner satisfaction with the dogs were investigated. The survey yielded answers for 326 dogs (164 whippets, 162 Italian greyhounds) given by a convenience sample of 268 caretakers. Compared to whippets, Italian greyhounds were reported more often to show aggressive behavior toward people (11.7% vs. 4.9%, $P < 0.05$), fear of people (13.6% vs. 6.1%, $P < 0.05$) and of dogs/other animals (10.5% vs. 2.4%, $P < 0.001$), separation distress (29.8% vs. 19.1%, $P < 0.05$) and house soiling (43.7% vs. 11.1%; $P < 0.001$) and less often to show predatory behavior (56.2% vs. 79.9%, $P < 0.001$). Age of the dog was the most often significant predictor among those studied, with older dogs being reported as showing less fear of people ($P < 0.001$), fear of dogs/other animals ($P < 0.01$), predatory behavior ($P < 0.05$), “disobedience/lack of cooperation” ($P < 0.001$), and “miscellaneous other issues” ($P < 0.01$). Intact females were reported as to be less challenging/demanding ($P < 0.010$), and to show stereotypies less often ($P < 0.001$) than other dogs. Dogs being scored the maximum score on satisfaction-related questions were associated with them being reliable, not challenging, and not being reported as showing out-of-context fear of other dogs and other animals (all $P < 0.05$).

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Introduction

Dogs and humans have been associating for a long time (Perri, 2016), and during this process, dog selection has resulted in a great variety of breeds present in modern times, which show wide differences in morphology and behavior (Goodwin et al., 1997; Turcsán et al., 2011; McGreevy et al., 2013; Serpell and Duffy, 2014; Salonen et al., 2020; Friedrich et al., 2020). Sighthounds are a group of dolichocephalic dogs (at present codified in different breeds), whose origins are likely to date as far as 6000 BC (Bartel et al., 2007), and whose physiology has been found to somewhat

differ from other dogs (Zaldivar-López et al., 2011). The English greyhound is the most often studied sighthound breed, probably due to its involvement in, and exploitation for (at least in some cases), sports competitions in the racing industry (Atkinson and Young, 2005). Indeed, some relatively recent behavioral studies have specifically targeted rescued greyhounds/galgos (Elliott et al., 2010; Thomas, et al., 2017; Howell et al., 2018; Howell and Bennett, 2020; Normando, et al., 2021a), but rescued dogs, due to their often traumatic background (Atkinson and Young, 2005; Robinson and Watkinson, 2020), may not be representative of the general population (Munkeboe et al., 2021). Moreover, rescued dogs are almost always gonadectomized (e.g., 742/747 greyhounds in Lord et al., (2007)), so the behavioral characteristics of intact animals (which may differ in some behavioral characteristics (Urfer and Kaerberlein, 2019)) could be under-represented in studies of a certain breed targeting only rescued dogs.

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1 Although a sighthounds breeds' representative (mainly the
 2 greyhound) is usually included in breed comparative behavioral
 3 studies, using expert ratings as the investigated dependent variable
 4 (Bradshaw et al., 1996; Bradshaw and Goodwin, 1998; Takeuchi and
 5 Mori, 2006; Notari and Goodwin, 2007), sighthounds are rarely re-
 6 presented in breed comparative behavioral studies using ques-
 7 tionnaires to caretakers or direct observations (an exception being
 8 Duffy et al. (2008)). This is probably due to them not being among
 9 the most common canine breeds, but studying them can be im-
 10 portant nonetheless. First, some undesirable canine behavioral traits
 11 have been found to correlate with cephalic index and/or height
 12 (McGreevy et al., 2013), and all sighthounds are dolichocephalic (i.e.,
 13 tend to have low cephalic indexes, although for Italian greyhounds
 14 (IGs) (miniature) this is less true than for other sighthound breeds)
 15 while greatly differing in height. Second, the variety of breeds within
 16 a domesticated species can be an important form of biodiversity
 17 (Jansson and Laikre, 2018) and hence promoting knowledge of the
 18 behavioral characteristics of local/native breeds that are not wide-
 19 spread could be important in promoting their spread in a re-
 20 sponsible way.

21 As the name implies, the IG is one of the 17 internationally re-
 22 cognized local/native breeds in the country in which the ques-
 23 tionnaire was done, and the only officially recognized sighthound
 24 representative among them. The whippet, a sighthound closely re-
 25 lated to the greyhound (Parker et al., 2017), is the breed most mor-
 26 phologically similar to the IG, and the most similar to it in size
 27 among the sighthounds. In Italy, whippets and IGs are, by large, the
 28 two most represented pedigree breeds among the sighthounds
 29 ("Enci," n.d.), and their popularity has, albeit slowly, increased in the
 30 last decade ("Enci," n.d.). However, responsible perspective care-
 31 takers wishing to investigate, the behavioral tendencies of these
 32 breeds in order to maximize matching to their expectations/pre-
 33 ferences/lifestyle, would find very little both in the scientific litera-
 34 ture and on the breeds' standards (see Table 1).

35 When done responsibly, choosing the right dog for one's family
 36 can be a difficult process (Wang et al., 2007; Tesfom and Birch, 2013),
 37 and people-related and dog related variables play a role in it (Ozcan
 38 et al., 2019). However, breed popularity appears to be influenced
 39 more by fashion than by desirable behavior, longer life, or fewer
 40 inherited genetic disorders (Ghirlanda et al., 2013). The latter finding
 41 is lamentable because behavior is pivotal in the human-animal
 42 relationship and a mismatch with owners' expectations is linked to the
 43 non-retention of dogs in the household (Protopopova and Gunter,
 44 2017). As a consequence, it is important that reliable, scientific-
 45 based information on the behavior of as many breeds as possible is
 46 made available to prospective caretakers, and that more importance
 47 is given to it upon dog's choice, in order to reduce potential mis-
 48 matches.

49 Therefore, this exploratory study aimed to investigate behavioral
 50 characteristics, as perceived by owners, and possible behavioral
 51 complaints in Italian Greyhounds and whippets, and to identify
 52 factors associated with them. It also aimed to evaluate whether
 53 these complaints and characteristics had an effect on owner sat-
 54 isfaction with the dogs and whether the breeds standards' de-
 55 scriptions were good in representing dogs' actual behavior as
 56 reported by their caretakers.

57 **Materials and Methods**

58 *The questionnaire*

59
 60 A dedicated questionnaire was developed for the survey, after
 61 consultation of the related scientific literature (Elliott et al., 2010;
 62 Thomas et al., 2017). The questionnaire included seven functional
 63 sections: demographics, management, health problems, general
 64 behavior, behavioral complaints, satisfaction with the dog, and signs
 65
 66

Table 1
 Behavioral description of the two breeds in the official breed standards.

Standard	IG	Whippet	Source for IG	Source for Whippet
FCI	Lively, affectionate, docile.	An ideal companion. Highly adaptable in domestic and sporting surroundings. Gentle, affectionate, even disposition.	FCI-Standard No. 200, http://www.fci.be/Nomenclature/Standards/200g10-en.pdf	FCI-Standard N° 162, http://www.fci.be/nomenclature/Standards/162g10-en.pdf
UK KC	Intelligent, affectionate and vivacious; may appear aloof.	An ideal companion. Highly adaptable in domestic and sporting surroundings. Gentle, affectionate, even disposition.	https://www.thekennelclub.org.uk/breed-standards/toy/italian-greyhound/	https://www.thekennelclub.org.uk/breed-standards/hound/whippet/
USA KC	-	Amiable, friendly, gentle, but capable of great intensity during sporting pursuits.	http://images.akc.org/pdf/breeds/standards/ItalianGreyhound.pdf	http://images.akc.org/pdf/breeds/standards/Whippet.pdf

FCI stands for Fédération Cynologique Internationale, KC for Kennel Club. Please note that in the FCI's grouping of breeds, IGs and whippets are both in group 10 (sighthounds), whereas, for the KC's, IGs are in the toys' group and whippets in the hounds' group.

Table 2
English translation of the stem of the various questions concerning the dependent variables used in the present study (possible behavioral complaints).

Variable	Question's stem (English)
Aggressive behavior	In the past six months, has your whippet/IG exhibited aggressive behaviors (e.g., showing teeth, growling, attempting to bite or biting people, other dogs, other animals)?
Disobedience/Unwillingness	In the past 6 months, has your whippet/IG been disobedient, uncooperative, "listless"? (e.g., running away/not returning at recall, refusing to move, showing behaviors of frustration when denied access to things he is occasionally allowed, showing little interest in the environment and people, though not showing signs of fear)
Fear	In the past 6 months, has your whippet/IG exhibited fear (e.g., attempts to move away/escape, low "cowering dog" postures, "tail between legs," trembling, lowered ears, excessive salivation, panting and/or vocalizing) not proportional to the actual dangerousness of the situation (e.g., fear of thunderstorms, fear of barrels, fear of non-threatening strangers, etc.)?
House soiling	After learning to eliminate outside of the home and/or in the designated place, your whippet/IG soils in the home
Miscellaneous other complaints	In the past 6 months, your whippet/IG has engaged in the following destructive or potentially annoying behaviors (e.g., showing "jealousy," eating feces, doing damage regardless of being left alone, rolling over feces and/or carcasses)?
Predatory behavior	In the past 6 months, has your whippet/IG exhibited predatory behavior (e.g., attempting to chase and/or catch other animals, chasing vehicles, etc.)?
Separation distress	How often in the past six months has your whippet/IG shown marked distress when left alone in the house (e.g., barking/whining insistently, and/or urinating and/or defecating and/or destroying objects, furniture, fixtures, doors)?
Stereotypies	How often, in the past 6 months, has your whippet/IG exhibited repeated activities that apparently have no purpose (e.g., insistently licking a body part even though apparently no clinical problems are present, chasing their tails, chasing shadows)

Table 3
English translation of the stem of the various questions concerning the dependent variables used in the present study (general behavioral characteristics) and their median in the general sample.

Variable	English translation of the stem	Median
Indicate on a scale of 1-10, where 1 stands for "Not at all" and 10 stands for "Completely" how well your dog matches the statements listed below. My whippet/IG.		
Active	tends to be active, full of energy, always ready to do something, never tired	8
Adaptable	adapts easily to the most varied situations without giving signs of stress	7
Avoiding interaction (people)	tends to evade and not reciprocate to people's requests for interactions	4
Challenging/demanding	is challenging/demanding	3
Gentle	approaches others in a kind and gentle way	9
Lying in contact	tends to sit or lie down near you or another family member	10
Reliable	is reliable in a wide variety of contexts	7
Shadowing the owner	tends to constantly follow you or another family member around the house, room by room	9
Soliciting active interactions [familiar people/ unfamiliar people]	actively solicits friendly interactions (asks for cuddles, games, shared activities) from [one or more of the people in the household / other people]	9 (familiar); 5 unfamiliar
Trying to please	tries to please you	8

of positive emotional states. The latter section and its results are presented elsewhere (Normando et al., 2021b), whereas key questions of the former six sections are included in the present paper. These sections are discussed in more detail below. The original questionnaire is provided as [Supplementary Material](#) to the present paper, together with its introduction including a link to the privacy policy form and the dataset. The English translation of the stems of the questions concerning possible behavior complaints and general behavioral characteristics, used as dependent variables in the present study, is shown in [Tables 2 and 3](#).

The first section of the questionnaire concerned: a) caretakers' demographics (e.g., age, gender, education, living place, role as professional breeders or private owner); b) dog's signalment (e.g., breed, sex and reproductive status, age, color, weight). The second section included questions about dog management aspects (e.g., age at adoption, source of the dog, daily routine, living place features, living with other dogs and/or with children), and source(s) of information when deciding to acquire that dog.

The third section dealt with health problems. Referring to a list of 18 health issues (e.g., pancreatitis, neurological problems, kidney problems, neoplasia), in the third section the respondent was asked to indicate any health problem ongoing ("present" health problem) or experienced in the past (past + present problems = "lifetime" health problems) by the dog. Additional questions investigated if the dog suffered or was suffering of any other health problems than those listed, and in case of an affirmative answer, which ones.

The fourth section, concerning general behavior, consisted in 23 items (e.g., "my dog is sensitive to the moods of other people/dogs",

"my dogs tends to yawn while being cuddled/petted"). The respondents were asked to rate on a 1-10 Likert scale how much the behavior of their dog corresponded to the one described in each statement. Only 10 of such statements (i.e., being active, adaptable, gentle, reliable, avoiding interaction with people, sitting/lying in contact with the human family, shadowing the owner, soliciting active interactions from the human family, soliciting active interactions from people outside the family, trying to please) were included in the present paper. We selected statements related to adjectives used in the standards of the two breeds at stake and statements that eventually could have relevance in investigating caretaker satisfaction (King, et al., 2009; Zeigler-Hill and Highfill, 2010; Normando, et al., 2021a; Normando, et al., 2022). The statement "Challenging/demanding" was also included, as unexpected demandingness of dog ownership has been shown to be among the most frequent causes of dogs' relinquishment (Protopopova and Gunter, 2017).

The fifth section was dedicated to present and past behaviors, which could be possible behavioral complaints/problems. We called them behavioral complaints/problems henceforth, although the questionnaire asked whether the dog showed the described behavior, not if it was a problem for the caretaker. For space reasons, the results concerning past problem behaviors will not be presented here. The part about present behavioral complaints investigated various issues, such as: aggressive behavior, predatory behavior, **out-of-context** fear, undesired elimination, "disobedience"/lack of cooperation (such as poor recall or having difficulties at learning tasks/tricks), problems when left alone, stereotypies, and miscellaneous potentially annoying problems (such as destructiveness or rolling on

1 stinking things). In designing this section, we tried to keep it similar
 2 to that of analogous studies already done on sighthounds (Elliott
 3 et al., 2010; Howell et al., 2018), while still tailoring it to the target
 4 breeds. For example, a dedicated sub-section targeted house soiling/
 5 toilet training, since they are anecdotally reported to be an issue
 6 with Italian greyhounds (IGs). For aggressive behavior, **out-of-con-**
 7 **text** fear, predatory behavior, disobedience/lack of cooperation and
 8 miscellaneous other potentially annoying problems, the questions
 9 had a hierarchical form, with two (predatory behavior, disobedience,
 10 annoying issues) or three (aggressive behavior, fear) levels of ques-
 11 tions asked.

12 The upper tiers dichotomous questions (yes/no) investigated the
 13 presence of each target behavior, which was briefly described. For
 14 example, for aggressive behavior, a first question asked whether in
 15 the previous 6 months, the dog had exhibited aggressive behaviors
 16 (e.g., showing teeth, growling, attempting to bite or biting people,
 17 other dogs, other animals). If the answer was “no”, then no further
 18 question was asked on aggressive behavior; if the answer was “yes”,
 19 a further question asked whether such aggressive behavior was di-
 20 rected toward people, other dogs, other animals (multiple answers
 21 were allowed). Depending on the selection, the appropriate set
 22 among the third tier was presented to the caretaker, asking fre-
 23 quency of aggressive episodes **toward** different targets. For the
 24 lowest tier of multiple choice answers, a frequency scale often used
 25 in similar studies (Elliott et al., 2010; Howell et al., 2018) was chosen:
 26 “never”, “rarely”, “sometimes”, “often”, “always”.

27 “Problems when left alone” (i.e., separation distress), **stereotypes**,
 28 and house soiling were asked using a single question (no tiers). The
 29 answers for the former two had the same frequency scale described
 30 above, with the addition of “not applicable, the dog is never left
 31 alone” for separation distress. The latter had a more detailed scale of
 32 frequency (**seven** levels), from “never/only when he/she has health
 33 problems” to “more than once a week”. The options “the dog never
 34 learned to toilet in the appropriate places” and “the dog was never
 35 taught to toilet in the appropriate places” were also provided.

36 In the present paper, we will present only results regarding the
 37 **upper-tier** questions and those of the three questions not hier-
 38 archically asked. In order to make the latter three similar to the other
 39 variables of section five, their answers were coded as binary.
 40 Therefore, for stereotypes and separation distress “never/rar-
 41 ely”=no, “sometimes/often/always”=yes, following Elliott et al.,
 42 (2010), with “not applicable, as the dog is never left alone” coded as
 43 a missing value. For house soiling, frequencies up to once every six
 44 months were considered as “0”, frequencies **> than** once every six
 45 **months**, and “never learned” were considered “1”, whereas “never
 46 taught” was considered a missing value.

47 The sixth functional section consisted in two non-contiguous
 48 questions, investigating caretaker's satisfaction with the dog. One
 49 asked how much the caretaker was satisfied with the dog on a **1-10**
 50 Likert scale. The other asked how much the caretaker would re-
 51 commend a friend to get a dog of the same breed of the dog referred
 52 to in the survey, based on his/her experience with that dog. This
 53 latter question was designed on the basis of the one used for as-
 54 sessing the Net Promoter score (Reichheld, 2003; Keiningham et al.,
 55 2007); therefore, the Likert scale provided went from 0 (“I would not
 56 recommend it at all”) to 10 (“I would definitely recommend it”).

57 The survey targeted whippet and Italian greyhound caretakers,
 58 although the question about the breed of the dog also included
 59 “other, please specify”, in order to rule out data not belonging to the
 60 two target breeds. If a caretaker had multiple whippets/IGs, he could
 61 complete the questionnaire several times, one for each dog.

62 The questionnaire was pre-tested for clarity and consistency of
 63 the questions, uploaded on the platform “Limesurvey” (LimeSurvey
 64 GmbH, Hamburg, Germany) and tested again. As the testing gave
 65 positive results, the survey was then publicized via word of mouth,
 66 breed clubs, and social media (i.e., Facebook groups dedicated to

whippets and Italian greyhounds), using a convenience sampling
 technique. Data were collected from May 2020 to May 2021.

Data treatment and analysis

All the variables included in the present paper were first ana-
 lyzed descriptively. By means of an online calculator (Rosner, 2006),
 Fisher exact tests were performed to evaluate if and how **many**
breeds (between the two breeds) and reproductive status (intact or
 neutered, in animals of the same sex) influenced each reported
 “present” health problem. No more complex statistics was per-
 formed due to the low percentage of caretakers reporting such
 health problems in their dogs. Fisher exact tests were performed also
 for “Lifetime” health problems, but only in regard to the breed. In
 fact, the dog could have developed the problem before being spayed,
 but the result as spayed at the moment the questionnaire was
 completed. The presence of any health problem was also considered
 as a possible predictor for the presence/absence of the behavioral
 variables and for caregiver's satisfaction.

Prior to use, the included eleven variables from section four
 (general behavior) were dichotomized by calculating their **median**
 and then assigning dogs to two categories: those scored > the
 median and those scored ≤ the median. For the variable “my dog
 tends to sit/lie down in contact with me or other members of the
 family”, whose median value equaled the maximum score (i.e., 10),
 dogs were categorized as follows: = **maximum** score or ≠ **maximum**
 score. Table 3 shows the medians of the studied characteristics in the
 general sample.

For some of the **management-related** variables it was necessary
 to group answers in wider levels (specified below) because of their
 distribution. The items regarding living with specific types of other
 dogs (i.e., whippets, IGs, other sighthounds other dogs) were united
 into the more general dichotomous variable “living with other dogs”,
 in order to decrease the number of possible predictive factors to be
 tested in the analysis.

Logistic regressions, with a stepwise selection procedure, were
 run using SAS (Statistical Analysis Systems Software Package Version
 9.4, SAS Institute, Cary, NC, USA) in order to assess which variables
 predicted the presence of the eleven behavioral complaints and the
 score of the dog being over the median (or the maximum, see
 above).

The possible predictors included in the stepwise selection pro-
 cedure were: caretaker's gender, age class (**18-30** years; **31-50**, > 50),
 education (compulsory schools; high school, university, post uni-
 versity education), breeder experience (yes; no, but I bred my dogs
 at least once; no), dog's age (in years, included in the model as
 continuous covariate), sex (intact male; castrated male; intact fe-
 male; spayed female), source (FCI recognized breeder; private;
 other), dog having pedigree (yes; no), dog having been bought (yes;
 no), age at adoption (up to 2 months; **2-6 months**; > 6 months), dog
 living exclusively in a flat (yes; no), dog accessing the bed(s) of the
 human members of the family (yes; no), presence of children under
 12 years old in the household (yes; no), dog living with other dogs
 (yes; no), frequency of walks on the leash (less than once a week;
 once a week to four times a week; ≥ five times a week), frequency of
 walks off leash (less than once a week; more than that), dog sport
 activities (yes; never), active play with the caretaker (less than once
 a week; up to once a day; more than once a day), mental stimulation
 games (never; up to 5 days a week; more than that), dog accom-
 panying the caretaker outside (less than once a day; more than that),
 presence of any health problem at present (yes; no). Cuddling/pet-
 ting frequency was excluded from the tested predicting variables
 because the answer was “more than one time a day” for 313 out of
 326 dogs. Post-hoc pairwise comparisons among levels of significant
 predictors were assessed using Bonferroni correction.

Table 4
Description of the sample, including the prevalence of health problems (any) and those of the studied behavioral characteristics/complaints. Numbers between brackets represent missing values. “C” stands for “castrated”, “F” for “female”, “I” for “intact”, “M” for “male”, “S” for “spayed”.

Variable	IGs (total 162)	Whippets (total 164)	All (total 326)
Age of the dog (years, mean ± SD)	4.9 ± 3.5	4.8 ± 3.0	4.9 ± 3.3
N of dogs by sex and reproductive status (IM, CM, IF, SF)	80, 16, 39, 27	57, 16, 46, 45	137, 32, 85, 72
% of dogs			
accessing “human” beds	65.4	48.2	56.7
acquired at > 6 months of age	13.6	15.8	14.7
actively playing with the caretaker more than once a day	45.1	43.3	44.2
having been bought	76.5	69.5	73.0
living in a flat	39.5	28.7	34.0
living with other dogs	58.6	68.9	63.8
living with another dog of the same breed	37.7	50.6	44.2
living with cats	14.8	33.5	24.2
living with children	15.4	9.8	12.6
being reported as having any “present” health problems	28.4	31.1	29.8
Percentage of dogs reported as showing			
Aggressive behavior (any target)	23.5	28.0	25.8
Aggressive behavior (people)	11.7	4.9	8.3
Aggressive behavior (other dogs)	16.7	25.0	20.9
Aggressive behavior (other animals)	3.1	4.3	3.7
Fear (any cause/context)	35.8	26.8	31.3
Fear (people)	13.6	6.1	9.8
Fear (dogs/other animals)	10.5	2.4	6.4
Fear (environmental situations)	27.8	23.2	25.5
Disobedience/lack of cooperation	22.8	19.5	21.2
House soiling	42.6 (4)	11.0 (2)	26.7 (6)
Other miscellaneous annoying issues (e.g., destructiveness etc.)	16.7	26.8	21.8
Predatory behavior (any target)	56.2	79.9	68.1
Separation distress	25.9 (21)	18.3 (7)	22.1 (28)
Stereotypies	22.2	14.0	18.1
Percentage of dogs obtaining			
Maximum score in satisfaction (recommending)	58.0	78.0	68.1
Maximum score in satisfaction (general)	66.7	78.7	72.7

Dog aggressive behavior toward other animals was excluded from the aforementioned analysis because of the low percentage of caretakers reporting it. This issue was analyzed using Fisher exact tests, in the same way as in the analysis of present health problems. Aggressive behavior (any target) and **out-of-context** fear (any cause), due to them being the generic counterpart of their **second-tier** questions, were analyzed only as done for present health problems.

Logistic regressions, with a stepwise selection procedure, were run using SAS (Statistical Analysis Systems Software Package Version 9.4, SAS Institute, Cary, NC, USA) also in order to assess which variables predicted the dog being scored the maximum score in the satisfaction questions. The possible predictors initially included in the stepwise selection procedure were the variables already cited for behavioral complaints, plus the presence of aggressive behavior to any target, aggressive behavior to people, aggressive behavior to dogs, aggressive behavior to other animals, predatory behavior (any target or context), out of context fear (any cause), fear of people, fear of animals, non-social/environmental fear, disobedience/lack of cooperation, separation distress, stereotypies, house soiling, other miscellaneous complaints, the dog being scored the maximum score in lying in contact and the dog being scored above the median in shadowing, challenging/demanding, reliable and gentle. Post-hoc pairwise comparisons among levels of significant predictors were assessed using Bonferroni correction. The aforementioned items were chosen because they were found to be significant for satisfaction in other types of dogs (shadowing) (Normando et al., 2021a), or linked to relinquishment (challenging/demanding) (Protopopova and Gunter, 2017), or because they were representative of standards' descriptors (e.g., “lying in contact” as representative of being affectionate; “gently approaching others” of being gentle, “reliable” of even disposition).

Fisher exact tests were used to compare the number of IGs and whippets having been given the maximum score in satisfaction. Moreover, we transformed data to have the answer to both questions on the same scale (%) and then compared them. To do so, we added

one to the responses given to the answer whose scale began from 0, so that both scales began from one, then we transformed all the values in percentage of maximum score. Cronbach's alpha was run on the obtained scores in order to investigate whether the two questions used to ask about satisfaction indeed measured the same underlying concept. The obtained values were also compared using Wilcoxon rank test, both on the overall sample and by breed, by means of the Statistica software (Statistica ver. 13, StatSoft, Hamburg, Germany). A Spearman test was done using the same software to assess correlation. In order to investigate which form of interaction was used more by IGs and whippets, the same analyses (i.e., Wilcoxon rank test, Spearman test) were performed on “lying in contact” vs “soliciting active interactions from the caretaker or other members of the family”.

Results

Sample description

Data on 326 dogs (162 IGs, 164 whippet), given by a convenience sample of 268 respondents (219 females, 49 males; mean age ± standard deviation (SD) = 45.7 ± 10.7 years) were gathered. Fourteen respondents were breeders (seven answering for an IG, seven for a whippet). Thirty-two respondents (17 answering for an IG, 15 for a whippet), answered not to be a breeder, but that their dogs had at least one litter. Except for 20 dogs (14 IGs, 6 whippets), who were born abroad, and two whippets, whose country of origin was unknown, all the dogs were born in Italy. Of the dogs for which the information was available, the majority (51.6%) were not born in the same region in which they were living. Most dogs were reported to be officially registered with the FCI (i.e., to have a pedigree), but 10 IGs and 19 whippets were not. Among these, 21 (7 IGs and 14 Whippets) were declared to have both parents officially registered with the FCI, whereas four (two IGs and two whippets) were stated to have both unregistered parents. Seventy-one percent of the dogs

Table 5
Percentage of dogs being reported as having the studied health problems.

Condition	"Present" (%)		"Lifetime" (%)	
	IGs	Whippets	IGs	Whippets
Bone fractures due to trauma	1.2	0.6	15.4	9.8
Dermatological pathologies (e.g. mycosis, pyoderma, other cutaneous lesions and rashes)	3.7	4.3	21.0	20.7
Ectoparasites (ticks, flea, lice)	0.6	1.2	14.2	24.4
Endocrinological, metabolic and automimmune disorders (excluding the ones cause by neoplasia)	1.2	1.2	1.2	3.7
Heart insufficiency and other cardiocirculatory pathologies	2.5	3.0	4.3	3.0
Hormone-dependent urinary incontinence (post spaying/neutering)	0.0	0.0	0.6	0.6
Infectious diseases including viral, bacterial and caused by protozoa (excluding pathologies with gastro-intestinal and/or respiratory symptoms, and pathologies caused by blood parasites)	0.0	0.0	3.1	3.7
Infestation with blood parasites and protozoa (e.g. leishmaniasis, dirofilariosis and others)	0.0	0.0	0.0	0.0
Infestation with intestinal parasites and protozoa (e.g. giardia, cryptosporidium and others)	1.2	0.0	13.6	20.7
Neoplastic disorders	1.2	1.2	4.3	1.8
Neurological pathologies (excluding tumors)	6.8	2.4	11.1	4.9
Orthopedic pathologies (myositis, tendinitis etc.), excluding traumatic fractures and tumors	2.5	3.7	5.6	11.6
Pancreatitis	0.0	0.6	0.6	4.3
Pathologies of the gastro-intestinal tract excluding tumors and occasional episodes of vomiting or diarrhea	0.6	1.2	16.0	10.4
Pathologies of the kidneys (excluding tumors)	0.0	0.6	0.0	1.8
Pathologies of the urinary tract (excluding tumors)	1.9	0.0	3.1	4.3
Respiratory pathologies	1.2	2.4	2.5	3.7
Skin wounds (lacerations in need of surgical attention/suturing)	1.2	0.6	14.8	30.5
All orthopedic disorders (traumatic + non-traumatic; excluding tumors)	3.7	4.3	19.8	18.9

had been adopted/acquired between two and six months of age. The most often cited sources of information upon acquiring the dog were websites/Facebook pages of breeders (31.3% overall, 25.0% whippets, 37.7% IGs), followed by "word of mouth" (17.8% overall, 18.9% whippets, 16.7% IGs). Further details on the sample are given in [Table 4](#).

Health problems

"Present" health problems' frequencies did not differ between the two breeds, but intact females were reported as having musculoskeletal issues less often than spayed ones ($P < 0.05$). When "lifetime" health problems' frequencies were analyzed, whippets were reported to have suffered from wounds needing suturing ($P < 0.01$) and ectoparasites more often ($P < 0.05$), and from neurological issues less often ($P < 0.05$), than IGs. The frequencies of health problems are shown in [Table 5](#).

Behavioral characteristics and complaints

Overall, caretakers answered that 94.0% of their dogs showed at least one of the listed behavioral complaints, although 11.5% of these dogs were only reported as showing predatory behavior, which actually has been a driver in the breed selection. The frequencies of each behavioral characteristic and complaint included in the present study are shown in [Tables 4](#) and [S1](#). Environmental/non-social fear resulted not associated with any of the variables included in the initial model. The results of the logit concerning the other behavioral complaints and the studied general behavioral characteristics are shown in [Table S2](#) and [S3](#), respectively. As can be seen in [Table 6](#), which gives a synopsis of the factors significantly associated with the studied behavioral complaints and characteristics, breed and age of the dog were the factors most frequently associated with the presence of the analyzed behavioral complaints and characteristics. However, no differences between breeds were found for aggressive behavior toward other animals, for aggressive behavior (any target) and for out of context fear (any cause), using Fisher Exact tests.

Dogs were rated more in "sitting/lying in contact" than in "actively soliciting positive interactions" with the human family (overall $Z = 5.38$, $P < 0.001$; IGs $Z = 5.01$, $P < 0.001$; whippets $Z = 2.91$, $P < 0.010$), and the scores were significantly correlated (overall $R = 0.43$, $P < 0.001$).

Satisfaction

Concerning caretaker's satisfaction, the dog assigned with the maximum score was associated with him/her being reliable, not challenging, and not showing (in the caretaker's perception) out of context fear of other dogs and of other animals (all $P < 0.05$), considering both satisfaction-related questions. Also, differences among the two questions' predictors were highlighted. For example, whippets were more likely ($P < 0.001$) than IGs to be given the maximum score in the question on recommending dog ownership, but no difference in the general satisfaction question was found between the two breeds. Further details on variables associated with increased or decreased satisfaction are shown in [Table 7](#). The results of the two satisfaction-related questions were significantly correlated (Spearman $R = 0.39$; $P < 0.001$). However, respondents gave higher scores to the question asking satisfaction in general than to the one asking whether they would recommend the dog-owning experience to a friend, in both the overall sample ($Z = 3.02$; $P < 0.01$) and in the IGs' one ($Z = 3.27$; $P < 0.010$); no such difference was found in the whippet sample ($Z = 0.29$; $P > 0.05$). Cronbach alpha equaled 0.34, further confirming that the two questions did not measure the same construct of owner satisfaction.

Discussion

The high percentage of behavioral complaints found in the present study agrees with previous studies, which found a high (i.e., 85%-95%) prevalence of complains ([Campbell, 1986](#); [Vacalopoulos and Anderson, 1993](#); [Khoshnegah et al., 2011](#); [Tamimi et al., 2013](#); [Chung et al., 2016](#); [Yamada et al., 2019](#)), although ([Giulioti et al., 2020](#)) found a lower one (<50%). Making valid comparisons is difficult, as studies on problem behaviors in dogs vary widely in aim, sample and methodology (including how questions and answers are framed, which behaviors are included, whether a list of behaviors is provided, and how the behaviors are defined). Hence, we will limit further comparisons to results of other studies done in Italy, using online questionnaires directed to dogs' caretakers, even if also such comparisons should be taken with caution, because of methodological differences (e.g., questionnaire, sample source).

Aggressive behavior toward other dogs was reported only (compared to [Diverio et al. \(2008\)](#), [Pirrone et al. \(2015\)](#) and [Giulioti et al. \(2020\)](#)) by 20.9% of our respondents, suggesting that IGs and

Table 6
Synopsis of the effects of the possible predictive factors on the analyzed behavioral possible complaints and characteristics. For more details, including the direction of the differences, please see [Supplementary Material](#).

Possible predictive factor	$P < 0.05$	$P < 0.01$	$P < 0.001$
Accessing "human" beds	Miscellaneous problems		Sitting/lying in contact
Age of the dog at adoption/acquisition			Fear people
Age of the dog	Trying to please	Active; Challenging; Disobedience; Fear dogs/animals; Fear people; Gentle; Miscellaneous problems; Predatory behavior	Reliable
Breed	Aggressive people; Fear people; Separation distress; Shadowing	Avoiding interactions with people; Challenging; Fear dogs/animals; Reliable	House soiling; Predatory behavior; Sitting/lying in contact; Soliciting interaction form family
Caretaker's education	Adaptable; Soliciting interaction outside family	Fear dogs/animals	
Caretaker's age class		Separation distress	
Frequency of accompanying the caretaker outside	Aggressive dogs	Miscellaneous problems; Reliable	
Frequency of active play	Shadowing; Sitting/lying in contact		Soliciting interaction from family; Soliciting interaction outside family
Frequency of walks on the leash	Stereotypies		
Health problems		Miscellaneous problems	Disobedience
Household with children	House soiling	Separation distress	
Living in a flat		Miscellaneous problems	
Living with other dogs	Trying to please		Stereotypies
Sex of the dog		Stereotypies	Challenging;
Source	Gentle		Trying to please
Sport activity	Challenging; Shadowing; Soliciting interaction form family	Predatory behavior; Sitting/lying in contact	

whippets are generally tolerant of other dogs (similarly to what found for *galgos* (Normando et al., 2021a).

The percentage of dogs being reported as showing predatory behavior (i.e., 68.1%), especially in whippets (79.9% in whippets vs. 56.2% in IGs), is in agreement with data for sighthounds (Bartel et al., 2007), and that for rescued greyhound (Howell et al., 2018) and *galgos* (Normando et al., 2021a). One-third of the whippets in the present study's sample lived with cats. Although predatory behavior somewhat decreased with age ($P < 0.010$), similar to what was found by Howell et al. (2018) for aggression to other animals, it could be important to consider this facet of whippets' and IGs' behavior when choosing to acquire/adopt a dog belonging to these breeds.

House soiling has been reported to be around 10% in both rescued greyhounds and dogs in general (Pirrone et al., 2015; Howell et al., 2018), which is less than half of what found in the present study (i.e., 26.7%). The difference appears to be due to the percentage found in IGs (i.e., 42.6), which is about four times higher than what found in the abovementioned studies. Although the cited studies used

different questionnaires, it is unlikely that such discrepancy is due only to methodological differences, given also that there is no difference between the prevalence in whippets (i.e., 11.0%) found in this study and what found in Pirrone et al. (2015) and Howell et al. (2018). Therefore, it is likely that IGs tend to show house soiling behavior more often than other dogs.

The percentage of IGs, and to a lesser extent of whippets, reported as showing separation distress is higher than what found by Howell et al. (2018) in ex-racer greyhounds (i.e., 15.4%). Sommesse et al. (2021) found a low median level (< 1 on a 0-5 scale) of "separation-related behavior" in Labrador retrievers, German shepherds, and Czechoslovakian wolf dogs in Italy, suggesting at a possible higher susceptibility of these breeds, especially IGs, to separation distress.

IGs were also reported as showing social fear more often than whippets (both toward people and dogs/animals), and avoiding interaction with strangers more often, which agrees with the description that they "may appear aloof" (UK KC standard). Pirrone

Table 7
Factors associated with the dog being given maximum score in the two satisfaction-related questions.

Max score in	MV	Factor	P value	Effect	Odds ratio (estimation)	95% wald confidence intervals		Model wald chi square ($P > \chi^2$)
						Lower	Upper	
Recommending dog ownership on the basis of the experience with present dog	48	Breed	0.000	IG vs. whippet	0.26	0.14	0.50	46.75 (0.000)
		Living with other dogs	0.001	No vs. yes	2.97	1.56	5.64	
		Fear of dogs/animals	0.030	No vs. yes	3.42	1.13	10.41	
		Max score in lying in contact	0.001	No vs. yes	0.34	0.18	0.65	
		Scored above median in "reliable"	0.031	No vs. yes	0.51	0.28	0.94	
		Scored above median in "challenging"	0.000	No vs. yes	2.99	1.64	5.47	
(General) satisfaction with the dog	48	Caretaker's age class	0.014	Ref: > 50 years				48.10 (0.000)
				31-50 years	0.35	0.17	0.71	
		Allowed on "human" beds	0.004	No vs. yes	0.40	0.21	0.74	
		Frequency of active play	0.001	Ref: more than once a day				
				Once weekly to once daily	0.40	0.19	0.84	
				Less than once weekly	0.21	0.09	0.47	
				Fear of dogs/animals	0.001	No vs. yes	6.77	
Scored above median in "reliable"	0.001	No vs. yes	0.32	0.16	0.61			
Scored above median in "challenging"	0.003	No vs. yes	2.72	1.42	5.20			

1 [et al. \(2015\)](#) investigated slightly different behaviors and found that
 2 9.7% of the dogs were reported as showing “fear during walks” (the
 3 only fear-related item in their study), which is likely to include both
 4 environmental and social fear when outside, whereas the figures for
 5 general fear/environmental fear in the present study are markedly
 6 higher.

7 Given this, together with IGs being reported to shadow the
 8 owner in the house more often than whippets (with more than a
 9 third of the IGs being assigned the maximum score), the data sug-
 10 gest that insecure or even anxious individuals could be more
 11 common among IGs.

12 Fearfulness/anxiety can negatively influence the affected dog’s
 13 quality of life ([Zapata et al., 2016](#)), therefore, it is important to make
 14 appropriate choices in future breed selection, to correct this trend
 15 and breed dogs with higher chances to be less insecure/anxious/
 16 fearful. There is a genetic component to such behavioral traits, al-
 17 though results vary widely among studies ([Saetre et al., 2006](#);
 18 [Hradecká et al., 2015](#); [Zapata et al., 2016](#); [Ilska et al., 2017](#); [MacLean](#)
 19 [et al., 2019](#)) and no study has investigated the within breed herit-
 20 ability in IGs. Some of the differences between IGs and whippets
 21 might be due to IGs’ smaller size since behavior problems may be
 22 more manageable to live with or perceived as less of a concern by
 23 caretakers. However, fearfulness and anxiety can affect the quality of
 24 life of a dog regardless of his/her size, so it is important for profes-
 25 sionals to educate caretakers of small dogs in this respect, as past
 26 and present environment, development, and life history are at least
 27 equally important as genetics in the expression of behavior ([Willson,](#)
 28 [2016](#)). The importance of life factors is supported also by our find-
 29 ings insofar that many of the demographic, life history and man-
 30 agement-related factors are associated with at least one behavioral
 31 problem/characteristic, although such factors likely represent only a
 32 small proportion of the past and present environmental variability
 33 experienced by the dogs. Young age was the most often associated
 34 with dogs being reported as showing possible problematic behavior
 35 and not as showing desirable traits, in agreement with what was
 36 found in other studies ([Pirrone et al., 2015](#); [Normando, et al., 2021a](#)),
 37 although the reverse was true for body licking.

38 Surprisingly, given the plethora of studies finding effects of
 39 neuter status on behavior ([Urfer and Kaeberlein, 2019](#)), the only
 40 variables affected by it were “being challenging/demanding” and
 41 stereotypies (both with intact males > intact females, spayed females
 42 > intact females).

43 The high median score reached by both breeds in “lying in con-
 44 tact” and “soliciting interactions with their human family” agrees
 45 with the standards which define the two breeds as “affectionate”
 46 (and “amiable” in the case of whippets by the USA KC), with IGs
 47 seeking contact and active interaction even more than whippets.
 48 People thinking of adopting/acquiring a dog of these breeds should
 49 be aware of this point, to avoid eventual mismatching, if a very high
 50 level of contact/interaction is not appreciated by the potential
 51 caretaker. Dogs of both breeds received high scores in “gentle”,
 52 without differences between them, even if being “gentle” is cited
 53 only in whippets’ breed standards. Furthermore, in the (European)
 54 standard “being of even disposition” is cited only for whippets, and
 55 this agrees with whippets being scored higher than IGs in “being
 56 reliable”. Whippets being affectionate, gentle, reliable, and not much
 57 challenging/demanding (median 3 out of 10), also appears to con-
 58 firm that.

59 In both satisfaction questions, the dog being “reliable”, not
 60 “challenging/demanding”, and not afraid of other dogs and animals
 61 predicted a maximum score in satisfaction with the dog, which was,
 62 overall, very high for both the breeds. Satisfaction negatively cor-
 63 related with both social and non-social fear also in [Howell et al.](#)
 64 [\(2018\)](#), but not in [Normando et al. \(2021a\)](#). Some significant pre-
 65 dictors differed for the two questions, including the breed. IGs
 66 caretakers (but not whippets’) scored their dogs higher when

general satisfaction was concerned than when asked whether they
 would recommend having a dog of that breed to a friend. IGs care-
 takers were also those scoring their dogs higher in being “challeng-
 ing/demanding” to keep. One possible explanation is that respon-
 dents perceived the general satisfaction question as a more explicit
 “judgment” of their dog, therefore answers were affected by the
 emotional bonding with their dog. Therefore, this question may
 not be a highly valid method to ask for satisfaction when companion
 animals are concerned. The second question was more indirect, thus
 avoiding the perception of being judgmental to one’s pet, but en-
 tailed an assessment of another person, who could not be “suitable
 enough” for such a special and/or challenging dog.

A surprising finding of the present study was that neither sat-
 isfaction-related questions were affected by the presence of health
 problems, house soiling or aggressive behavior, even if being healthy
 and house-trained is among the ideal dog’s traits for Italians ([Diverio](#)
[et al., 2016](#)). Health problems are frequent reasons to return newly
 adopted dogs to shelters ([Wells and Hepper, 1999](#)) and aggression is
 among the most frequent causes of relinquishment ([Protopopova](#)
[and Gunter, 2017](#)), in general. Our finding could be explained by the
 relatively low number of dogs being reported as showing aggression
 in the sample, agreeing with what found for *galgos* in [Normando](#)
[et al. \(2021a\)](#), or to questions not investigating whether the ag-
 gressive behavior was severe enough to cause concern.

It is difficult to compare our results concerning health issues with
 other published papers, as they differ in some relevant variable (e.g.,
 targeted population ([Wells and Hepper, 1999](#); [Lord et al., 2007](#))),
 more specific pathologic target ([Brambilla et al., 2020](#)), data source
 ([O’Neill et al., 2021](#)), or used metrics ([Evans and Adams, 2010](#); [Baioni](#)
[et al., 2017](#)). Overall, the dogs in our sample appeared healthy, since
 less than 1% of them were reported as having neoplastic, orthopedic,
 digestive, endocrine, and, for whippets only, neurological issues. The
 abovementioned values of prevalence are lower than those reported
 by [Lord et al. \(2007\)](#) for ex-racing greyhounds. [O’Neill et al. \(2021\)](#)
 reported a higher prevalence of enteric problems as well, but also a
 lower one for urinary ones in UK dogs under primary veterinary care.
 The present study is exploratory and the sample size is relatively
 low, but the finding that intact females have musculoskeletal issues
 less often than spayed ones indirectly agrees with the higher chance
 of cruciate ligament rupture, in general, found by [Witsberger et al.](#)
[\(2008\)](#) in spayed females.

Our study has the typical limitations of surveys based on vol-
 unteers ([Rosenthal, 1965](#); [Krumpal, 2013](#); [Cohen and Todd, 2019](#)),
 such as partial representativity and subjectivity. It is important to
 note that there could be no certainty that caretakers were only re-
 porting dog’s health issues diagnosed by a professional, and the
 same was true for behavioral problems. However, the caretakers’
 perception of the dog’s behavior is important because it influences
 the caretaker’s willingness to maintain the dog-human relationship.
 A wide array of potential problems, which can have very different
 contributing developmental factors, were investigated, making the
 questionnaire rather long and complex. These features of the ques-
 tionnaire could have affected respondents’ concentration and will-
 ingness to complete it, contributing to the relatively small
 sample size.

Conclusions

There is little research on non-rescue sighthounds, and the be-
 havioral features and problems of this dog group are not well known
 by professionals. Therefore, our exploratory study investigates be-
 havioral complaints and owner satisfaction in the two most common
 sighthound breeds in Italy: the Italian greyhound, a local/native
 breed, and the whippet. Our study is explorative in nature, so further
 research is needed to investigate the features of the two breeds in
 detail. Our results highlight many positive behavioral characteristics

1 of these breeds and some critical aspects that may warrant redress.
 2 Whippets and IGs appear to be good companions, very affectionate,
 3 gentle, not challenging, quite reliable and tolerant of other dogs,
 4 confirming the (somewhat scant) descriptions given in the breed
 5 standards. The very high demand for contact and interaction, the
 6 high tendency to show predatory behavior (especially in whippets)
 7 and the high tendency of IGs to house soil and to show behaviors
 8 possibly related to insecurity/anxiety/fearfulness, as perceived and
 9 reported by caretakers, are also important features to be known by
 10 potential adopters and by breeders, in order to improve their
 11 breeding program to obtain dogs who are perceived as being (and
 12 are) more emotionally stable.

13 Moreover, the data presented here could be useful for profes-
 14 sionals working with dogs, such as veterinarians, who have to
 15 counsel potential dog owners, advising them in the choice of a
 16 puppy, or dog trainers, who need to set up educational programs.
 17 The general public can benefit from this study's results because they
 18 can have an insight in two not very popular breeds in Italy, but with
 19 great potential as companion dogs for singles and families. However,
 20 it is important to underline the exploratory nature of the present
 21 study, advising that the findings of the present study should be seen
 22 as preliminary and as a suggestion for further research.

23 Authors' Contributions

24 **SN** conceived of the study; **SN, LC, LF** designed study; all authors
 25 contributed to the research phase; **BC** and (to a much lesser extent)
 26 **SN** analyzed data, all authors discussed findings, **SN**, with the col-
 27 laboration of all the other authors, wrote the paper. All authors re-
 28 vised the paper.

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32 Ethical Considerations Statement

33 Respondents were advised about their rights, data management
 34 and protection in accordance with the Regulation (EU) 2016/679 and
 35 they were asked to express their informed consent to take part to the
 36 study. No Ethical committee approval is needed in Italy for this kind
 37 of studies. This notwithstanding, the Institutional Review Board of
 38 the University of Padua reviewed and approved the research (OPBA
 39 protocol 52/2022).

40 Conflict of Interest

41 All authors report no conflicts of interest: none of the authors has
 42 any financial or personal relationships that could inappropriately
 43 influence or bias the paper's content.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in
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