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Pets and their owners during the first COVID-19 lockdown period: Perceived changes in routines and emotions – An exploratory study

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A B S T R A C T
An international online questionnaire Pets in Lockdown was conducted during the first COVID-19 lockdown during the months of April and May 2020 to assess how pet owners perceived some aspects of their relationship with their pets, including time spent together and how much they enjoyed it, difficulties taking care of their pets, the amount of comfort they obtained from interacting with their pets, and whether they had observed any changes in their pets’ resting time and behavior. Most pet owners did not describe any changes in the relationship with their pets or in their pets’ behaviour. Horse owners expressed more difficulties taking care of their animals than owners of other species. Approximately 20% of the animals had less time available to rest undisturbed. Of the animals that displayed behavioral changes, remaining closer to the owner was the most frequently described change followed by descriptions of higher arousal and increased negative affective states.

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Introduction
During the spring of 2020, the COVID-19 pandemic caused by SARS-CoV-2 affected the lives of millions of people around the globe, not in the least because they were asked to stay home as much as possible and restrict their social interactions. These restrictions had notable consequences on the psychological wellbeing of the population, with high levels of post-traumatic (due to illness or loss of loved ones) and COVID-related stress, depression and feelings of loneliness reported worldwide (Cooke et al., 2020; Killgore et al., 2020).

Companion animals may have helped their owners cope with the consequences of lockdown, potentially acting as social support against loneliness or giving comfort (Ratschen et al., 2020). But there could also be negative aspects of pet ownership during this period. Pet owners had concerns about increased difficulty in accessing veterinary services or about the financial aspects of pet ownership (Parry, 2020; Ratschen et al., 2020). More time spent at home may also have increased the chances of pet aggression, especially with children (Jakeman et al., 2020), or worsen the symptoms of allergies (Applebaum et al., 2020).

The situation may have also had positive consequences for companion animals. For example, Christley et al. (2021) have reported that dog owners in the UK increased the time that they spent playing with and training their dogs during lockdown. An increase in shared activities has been associated with a stronger Human-Animal Bond (Clark and Boyer, 1993; Lefebvre et al., 2007). However, the diminished wellbeing of pet owners, together with changes in routine due to the lockdown itself, is also likely to have affected companion animals. Dogs and horses may have experienced reduced physical activity and opportunities to socialise with conspecifics; outdoor cats may have ventured further afield.
than normal while roaming outside due to decreased road traffic and quieter streets, and encountered more conspecifics (Hargrave, 2020a-c). In addition, all species may have had fewer opportunities to rest or isolate themselves due to the increased social interaction with humans as a result of owners (and sometimes children) being at home (Christley et al., 2021). Increased stress for companion animals can lead to the onset of undesired behaviors (Sonntag and Overall, 2014). Changes in the behavior of pets may affect how owners perceived the pros and cons of the relationship, therefore, potentially affecting the animals’ welfare and their chances of being relinquished (Applebaum et al., 2020).

The present study was designed to explore potential changes in specific aspects of the human–animal relationship such as the amount of time the respondents spent with their animals, how much the owners enjoy that time together, the amount of comfort that they obtain from their pets and whether they perceive difficulties associated with pet ownership. It also investigates changes in the routine of the animals, focusing on the amount of undisturbed resting time. This parameter is likely to be equally important to the welfare of all species, as opposed to other factors, such as intra or interspecific social interaction or changes in exercise levels, that can affect some species more than others. In addition, changes in behavior as observed by the owner will be explored to detect whether there was an increase in undesired behaviors during the first COVID-19 lockdown.

Methods

This study was part of a broader investigation regarding the potential benefits of pet ownership during the first government-imposed lockdowns. An international questionnaire was administered using Survey Monkey and was available in English, French, Dutch, German, Italian and Spanish. It was available from the 2nd of April 2020, which was approximately 2 weeks after the start of the lockdown in most countries included, until the 29th of May 2020, when most of the lockdown measures were being lifted.

This questionnaire was anonymous and preceded by an informed consent form. It was directed at both pet owners and people without pets who were older than 18 who lived, at the moment of taking the survey, in a “lockdown situation,” defined as a situation where “you are restricted or not allowed to go outside and that you should keep your distance from people who don’t live in your house.” The part of the questionnaire described in this article was exclusively directed at pet owners and included a series of questions (6 closed and one open) regarding aspects of the relationship between the respondents and their pets, as well as about the changes in their pets’ routines. The questions gauged whether, compared to before the lockdown, i) the time that the owner spent with the pet had increased, decreased, or stayed the same, ii) the owners enjoyed spending time with their pets more, less or the same, iii) the pets brought comfort to their owners more, less or the same, iv) taking care of the pet was easier, more difficult or the same, v) the time that the pet could rest undisturbed had increased, decreased or stayed the same, and vi) the pet had shown behavioral changes. If the respondent answered positively to the latter, they were given the opportunity to elaborate more on the subject. Answers to the latter open question regarding changes of behaviors during the lockdowns were translated from Dutch, French, German, Italian, Portuguese and Spanish to English by native speakers and coded by the first author into different categories based on the most frequent themes that emerged in the answers (O’Cathain and Thomas, 2004). The respondents were given the chance to complete the questionnaire for up to 4 different pets.

An exploratory descriptive analysis was performed using IBM SPSS statistics 27. Response frequencies (in percentage) for each question were examined, with the total number of responses (N) representing the number of participants that answered each question. A Kruskal-Wallis H test with post-hoc analysis was performed to find potential differences between species.

Results

A summary of the participants’ demographic information can be found in Table 1. Information regarding 6399 companion animals from 5454 pet owners was received. Most of the animals in the study were dogs (561.1%, n=3589) and cats (35.9%, n=2296), followed by horses (2.8%, n=178), rabbits (1.8%, n=118), birds (1.2%, n=78), small rodents (0.9%, n=61), fish (0.4%, n=24), reptiles (0.4%, n=24) and “other species,” such as goats or sheep, alpacas, tarantulas or ferrets (3.4%, n=218). Table 2 shows the answers to each of the closed questions for the species that represent more than 1% of the answers in the sample, with the exception of the category “other species” (which was too diverse to interpret).

There were no significant differences between species in any of the questions and therefore no post-hoc analysis was performed (Table 3). The main numerical difference between species was found in the question about taking care of the pet. The owners of 25.7% (n=46) of horses found that taking care of their horses was more difficult than before the start of the lockdown, which is a considerably larger percentage than any of the other species. On the other hand, owners of a considerably higher percentage of horses (38.3%, n=67) declared to enjoy the time spent with their horse more than before. The answers to the open question regarding changes of behavior were coded in the categories described in Table 4. The categories are not mutually exclusive, as respondents often described several changes in behavior or affective state. The answers that described both arousal and affective states were coded separately and together to create new combined categories. The most frequently mentioned behavioral changes are included in Table 5. Many respondents did not describe behavioral changes but instead changes in affect or mood. A total of 5.5% of answers referred to different states or behaviors that could not be included in the categories, such as eating more or less or changing preference from one human to other. A total of 5.6% used unclear terminology that did not describe a specific behavior or state. Among those answers, it was relatively common to report that the pet “missed” things, especially in the case of dogs, for example, missing certain walks, their training or their dog friends. Besides this, other recurrent answers that were given reported the animal as “spoiled” or declared that the pet “knew that something was going on” or “felt the stress of the owners.”

Discussion

The COVID-19 pandemic that is currently still ongoing is likely to affect both pet owners and their companion animals. This exploratory study illustrates how the pet owners that participated in our study perceived some aspects of the relationship with their pets and on the pets themselves during the first COVID-19 lockdown.

Despite the previously reported concerns about the difficulty to take proper care of their pets during lockdown (Ratschen et al., 2020), most participants of the present study did not report any changes in this aspect of the relationship. However, the owners of about one quarter of the horses and ponies in the study reported that taking care of their animals was more difficult than before.
Table 1
Summary of the demographic information expressed as the percentage (and total number) of respondents ascribed to each of the subcategories of possible answers

| Questionnaire item and possible answer options | Percentage and number (n) of respondents |
|------------------------------------------------|----------------------------------------|
| Gender (N = 5,444)                              |                                        |
| Male                                           | 552 (10.14%)                           |
| Female                                         | 4866 (89.38%)                          |
| Other                                          | 26 (0.48%)                             |
| Country (N = 5,453)                            |                                        |
| Belgium                                       | 3671 (67.43%)                          |
| Brazil                                        | 58 (1.07%)                             |
| France                                        | 751 (13.80%)                           |
| Germany                                       | 79 (1.45%)                             |
| The Netherlands                                | 380 (6.97%)                            |
| Spain                                         | 253 (4.64%)                            |
| The UK                                        | 155 (2.84%)                            |
| The USA                                       | 106 (1.94%)                            |
| Age (N = 5,448)                                |                                        |
| 18-25                                         | 826 (15.16%)                           |
| 26-35                                         | 1322 (24.27%)                          |
| 36-45                                         | 1130 (20.74%)                          |
| 46-55                                         | 1115 (20.47%)                          |
| 56-65                                         | 798 (14.65%)                           |
| Older than 65                                 | 257 (4.72%)                            |
| Employment Status (N = 5,383)                  |                                        |
| Full time                                     | 2207 (41.00%)                          |
| Part time                                     | 859 (15.96%)                           |
| Homemaker                                     | 167 (3.10%)                            |
| Retired                                       | 455 (8.45%)                            |
| Self-employed                                 | 566 (10.51%)                           |
| Student                                       | 617 (11.46%)                           |
| Unable to work                                 | 283 (5.26%)                            |
| Unemployed                                    | 229 (4.25%)                            |

N = Total number of people that answered the question (Martos Martinez-Caja et al., 2021)

Table 2
Summary of the answers for the 5 most common species in the sample (at least 1 % of the sample), expressed as the percentage (and total number) of pets ascribed to each of the subcategories of possible answers

| Characteristics                                      | Dogs | Cats | Horses/Ponies | Rabbits | Birds | Total* |
|------------------------------------------------------|------|------|---------------|---------|-------|--------|
| Taking care of my pet is...than before               |      |      |               |         |       |        |
| Easier                                              | 19.0% (682) | 15.6% (363) | 30.7% (55) | 22.1% (27) | 27.5% (22) | 18.4% (1149) |
| Same                                                | 68.0% (2411) | 79.5% (1845) | 43.6% (78) | 71.3% (87) | 66.3% (53) | 71.6% (4474) |
| More                                                | 12.9% (458) | 4.8% (112) | 25.7% (46) | 6.6% (8) | 6.3% (5) | 10.1% (629) |
| I get...comfort from pet than before                |      |      |               |         |       |        |
| Less                                                | 0.3% (12) | 0.3% (7) | 2.9% (5) | 0.0% (0) | 0.0% (0) | 0.4% (24) |
| Same                                                | 72.7% (2581) | 69.9% (1587) | 77.1% (135) | 76.7% (92) | 77.2% (61) | 71.9% (4456) |
| More                                                | 26.9% (955) | 29.8% (678) | 20.0% (35) | 23.3% (28) | 22.8% (18) | 27.7% (1714) |
| I spend...time interacting with my pet than before  |      |      |               |         |       |        |
| Less                                                | 3.4% (119) | 0.5% (12) | 19.4% (34) | 1.6% (2) | 1.2% (1) | 2.7% (168) |
| Same                                                | 43.8% (1554) | 46.8% (1062) | 25.7% (45) | 48.4% (59) | 61.7% (50) | 44.7% (2770) |
| More                                                | 52.9% (1876) | 52.7% (1196) | 54.9% (96) | 50.0% (61) | 37.0% (30) | 52.6% (3259) |
| I enjoy spending time with my pet...than before      |      |      |               |         |       |        |
| Less                                                | 2.8% (101) | 0.5% (12) | 5.1% (9) | 0.0% (0) | 0.0% (0) | 2.0% (122) |
| Same                                                | 67.7% (2404) | 69.6% (1582) | 56.6% (99) | 69.7% (85) | 76.5% (62) | 68.2% (4232) |
| More                                                | 30.4% (1045) | 29.9% (679) | 38.3% (67) | 30.3% (37) | 23.5% (19) | 29.8% (1847) |
| My pet has...time available for undisturbed rest    |      |      |               |         |       |        |
| Less                                                | 21.9% (775) | 21.9% (491) | 9.1% (16) | 16.7% (20) | 16.5% (13) | 21.4% (1315) |
| Same                                                | 69.5% (2462) | 73.0% (1637) | 72.6% (127) | 79.2% (95) | 78.5% (62) | 71.2% (4383) |
| More                                                | 8.6% (304) | 5.0% (113) | 18.3% (32) | 4.2% (5) | 5.1% (4) | 7.4% (458) |
| Has your pet changed behavior during the lockdown?  |      |      |               |         |       |        |
| Yes                                                 | 18.3% (658) | 17.8% (408) | 7.4% (13) | 8.9% (11) | 14.1% (11) | 17.6% (1101) |
| No                                                  | 81.7% (2931) | 82.2% (1889) | 92.6% (162) | 91.1% (113) | 85.9% (67) | 82.4% (5162) |

*Percentages and number of answers correspond to the 5 species together.

Table 3
Kruskal-Wallis H test to test differences between species in the answers to the 6 questions included

|          | N     | Test statistic | d.f | Sig  |
|----------|-------|----------------|-----|------|
| The time that the owner spent with the pet had increased, decreased, or stayed the same | 4,866 (8,557) | 4 | 0.073 |
| The owners enjoyed spending time with their pets more, less or the same | 4,868 (7,577) | 4 | 0.108 |
| The pets brought comfort to their owners more, less or the same | 4,865 (5803) | 4 | 0.214 |
| Taking care of the pet was easier, more difficult or the same | 4,869 (8,529) | 4 | 0.074 |
| The time that the pet could rest undisturbed had increased, decreased, or stayed the same | 4,871 (8,345) | 4 | 0.072 |
| The pet had shown behavioral changes | 4,922 (9,317) | 4 | 0.054 |
This may be due to the confinement and mobility restrictions imposed during the lockdown. Many horse owners do not live close to their horses, and may depend on riding schools and clubs that may have closed or restricted their opening times and capacity (Hargrave, 2020b). On the other hand, the owners of a numerically higher percentage of horses, compared to other species, enjoyed the company of their horses more than before, which could be explained by the fact that interacting with their horses may have also entailed leaving the house, and exercising in the open air.

For half of the animals, the owners reported spending more time with them than before the lockdown, and most of the owners enjoyed it at least as much as before. In addition, more than one quarter of cats and dogs were described as providing more comfort to the owners than they did before the COVID-19 crisis. It has been reported that pet owners indeed believe that pets can help them cope with the consequences of lockdown (Holland et al., 2021; Ratschen et al., 2020).

Although most pets had the same amount of resting time as before, time to rest undisturbed decreased for 1 in 5 animals. However, since a definition of rest was not provided, the interpretation of the question may have differed between participants. Decreased sleep time may affect memory and neural plasticity and is considered both an indicator and a risk factor for diminished welfare in multiple species (Abou-Ismail et al., 2007; Owczarczak-Garstecka et al., 2020).

### Table 4

Categories for classification of the answers to the question "Please specify which behavioral changes you have noticed"

| Category                        | Description                                                                 | Examples of words and expressions included            |
|---------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------|
| Closer to the Owner             | Answers that suggest that the animal has become closer to the owner (physically and/or emotionally) | "attached," "affectionate," "asks or seeks for constant attention," "has become my shadow," "has become clingy" |
| Less close to the Owner         | Answers that suggest that the animal has become less close to the owner (physically and/or emotionally) | "looks for places to be alone," "more independent," "less attached," "less affectionate" |
| More Vocal                      | Answers that suggest an increase in the frequency of vocalizations           | "Meows more," "Barks more," "More vocal," "Chatty," "More talkative" |
| Improved behavioral Problem     | Answers that suggest an apparent improvement in a previously detected behavioral problem | "less fear from humans," "less separation anxiety," "less aggressive," "More fearful on walks," "more separation anxiety," "inappropriate elimination" |
| Worsened behavioral Problem     | Answers that suggest an apparent worsening in a previously detected behavioral problem | "more active," "livelier," "excited," "nervous," "restless," "more energetic," "More reactive," "calmer," "quieter," "more tire," or "apathetic" |
| High Arousal                    | Answers that suggest a higher level of activity                             | "happy/happier," "relaxed," "calmer," "enthusiastic," "satisfied" |
| Low Arousal                     | Answers that suggest a lower level of activity                              | "Sad," "Restless," "Stressed," "apathetic," "Scared" or "Depressed" |
| Positive Affect                 | Answers that suggest a positive emotional state                            | "Excited," "Enthusiastic," "Active and happy," "More" |
| Negative Affect                 | Answers that suggest a negative emotional state                            | "Restless," "Nervous," "Uncomfortable," "Annoyed" |
| High Arousal and Positive Affect| Answers that suggest a higher level of activity combined with a positive emotional state | "Calmer," "More relaxed" |
| High arousal and Negative Affect| Answers that suggest a higher level of activity combined with a negative emotional state | "apathetic," "depressed" |
| Low Arousal and Positive Affect  | Answers that suggest a low level of activity combined with a positive emotional state | "Has started sleeping in the attic," "Looks for new places to sleep away from people" |
| Low Arousal and Negative Affect  | Answers that suggest a low level of activity combined with a negative emotional state | "goes outside less," "prefers to stay indoors," "doesn't want to go outside anymore" |
| Altered Resting Place           | Answers that suggest that the animal has changed their resting place        | "wants to be outside more often," "spends more time outside," "doesn't come inside when called" |
| More Time Indoors               | Answers that suggest that an animal prefers to be indoors more than before   | |
| More Time Outdoors              | Answers that suggest that an animal prefers to be outdoors more than before   | |

### Table 5

Percentages (and numbers) of responses by owners indicating each of the behavioral changes (not mutually exclusive) for the 5 most common species in the sample

| Category                        | Dogs (N = 658) | Cats (N = 408) | Rabbits (N = 11) | Horses/ Ponies (N = 13) | Birds (N = 11) |
|---------------------------------|---------------|---------------|-----------------|-------------------------|---------------|
| Closer to the owner             | 33.0% (217)   | 48.0% (196)   | 63.6% (7)       | 46.2% (6)               | 81.8% (9)     |
| Less close to the owner         | 35.0% (23)    | 9.6% (39)     | 0.0% (0)        | 0.0% (0)                | 0.0% (0)      |
| Alert                           | 2.0% (19)     | 7.0% (3)      | 0.0% (0)        | 0.0% (0)                | 0.0% (0)      |
| More Vocal                      | 3.5% (23)     | 3.0% (16)     | 0.0% (0)        | 0.0% (0)                | 0.0% (0)      |
| Improved behavioral problem     | 3.5% (23)     | 2.9% (12)     | 0.0% (0)        | 15.4% (2)               | 0.0% (0)      |
| New/ Worsened behavior Problem  | 7.4% (49)     | 3.7% (15)     | 0.0% (0)        | 7.7% (1)                | 0.0% (0)      |
| High Arousal                    | 22.8% (150)   | 10.5% (43)    | 0.0% (0)        | 23.1% (3)               | 0.0% (0)      |
| Low Arousal                     | 10.6% (70)    | 7.1% (29)     | 9.1% (1)        | 15.4% (2)               | 0.0% (0)      |
| Positive Affect                 | 13.7% (90)    | 10.0% (41)    | 18.2% (2)       | 15.4% (2)               | 27.3% (3)     |
| Negative Affect                 | 23.4% (154)   | 11.8% (48)    | 0.0% (0)        | 7.7% (1)                | 0.0% (0)      |
| High Arousal and Positive Affect| 1.7% (11)     | 0.5% (2)      | 0.0% (0)        | 0.0% (0)                | 0.0% (0)      |
| High Arousal and Negative Affect| 11.9% (78)    | 6.4% (26)     | 0.0% (0)        | 15.4% (2)               | 0.0% (0)      |
| Low Arousal and Positive Affect  | 7.1% (47)     | 5.9% (24)     | 9.1% (1)        | 7.7% (1)                | 0.0% (0)      |
| Low Arousal and Negative Affect  | 0.8% (5)      | 0.0% (0)      | 0.0% (0)        | 0.0% (0)                | 0.0% (0)      |
| Altered resting place           | 2.1% (14)     | 4.2% (17)     | 0.0% (0)        | 0.0% (0)                | 0.0% (0)      |
| More time inside                | 0.0% (6)      | 3.7% (15)     | 0.0% (0)        | 0.0% (0)                | 0.0% (0)      |
| More time outside               | 3.5% (23)     | 4.2% (17)     | 0.0% (0)        | 0.0% (0)                | 0.0% (0)      |

Per species, the percentages are calculated as the number of animals with a particular behavioral change, divided by the total number of animals that had changed behavior during the lockdown, times 100.
and Burman, 2016; Yngvesson et al., 2017), which could in turn lead to behavioral problems. However, dogs have been reported to be more alert while resting when they are alone compared to when they are with other dogs (Kortekaas & Kotschal, 2020). Although Kortekaas & Kotschal’s study did not explore whether the presence of humans has the same effect, the increased presence of the owners at home, even if it reduced the time dedicated to rest, could have allowed a more relaxed resting behavior. Dogs spend an average of 10.1 hours/day sleeping, of which only 3 hours occur during the day (Kinsman et al., 2020). Cats on the other hand, sleep between 12 and 16 hours/day with the hours split between night and day (Campbell & Tobler, 1984). Cats therefore need more time to rest during the day and may have been more affected by the reduced resting time. Despite this, there were no significant differences in the number of cats and dogs with decreased resting time nor in the number of cats and dogs that had changed behavior.

At the time of the study, most pets had not changed their behavior according to their owners. This percentage was particularly high compared to other populations that have been studied during the same period (Bowen et al., 2020). As previously reported by Bowen et al. (2020) and Holland et al. (2021), the most frequent change was becoming more affectionate and attached to the owners. In the present study, this increase was especially high in rabbits—a species that may benefit from habituation to the presence of humans—but it was also high for cats, horses, and dogs. Although this may be a positive finding that reflects an improvement in the bond between the respondents and their pets, it also needs to be approached with caution. As lockdowns are temporary situations, the eventual return to normality may lead to an increase in behavioral problems such as separation related issues (Holland et al., 2021). This could also apply to people that reported an improvement in previous behavioral issues, such as inappropriate elimination, intransigence or aggressive behavior, once the lockdown is over. A desensitization protocol to gradually habituate the animals to spending more time alone could be beneficial for pet owners in this situation (Butler et al., 2011).

There were not many descriptions of animals becoming less affectionate, more independent or avoiding the owners. This is particularly relevant for cats, as avoidance behaviors can be important indicators of stress (Hargrave, 2020a). This could imply that most animals in the study did not find the increased presence of humans at home stressful. However, we did not collect information about the amount of space that the animals had available, a factor that could have affected whether animals were able to avoid humans or not. There were relatively frequent descriptions of higher arousal states, which has previously been reported for dogs but not for cats (Bowen et al., 2020). Animals were described as being more nervous, enthusiastic, active, etc. In the case of dogs, this can be explained by the extra stimulation due to the increased presence of people in the household (Hargrave, 2020c), but also by the decrease in exercise (Bowen et al., 2020; Holland et al., 2021). Answers with sentences such as “the dog misses his/her walks” frequently accompanied the description of higher arousal states. In addition, although relatively infrequent, negative affective states were also described, most often by dog owners. Those negative states usually appeared in the context of reduced walks and reduced ability to socialize with other dogs, as had been anticipated (Hargrave, 2020c). The number of problematic behaviors that were reported was low, suggesting that the risk of relinquishment may not have increased in this population during this period. Nevertheless, the study only covered the early months of the pandemic, and new lockdowns have been implemented since. Further research on the potential cumulative effects of lockdowns is needed.

Conclusion

During the first COVID-19 pandemic lockdown the investigated aspects of the relationship between the participants and their pets had not changed for the majority of owner-pet dyads. In addition, most animals had not displayed new behaviors that could be considered undesirable. However, in 1 in 5 pets had less undisturbed resting time. The most common behavioral changes reported involved the animals becoming more attached to the owners. This exploratory pilot gives a view of some facets of the human-animal relationship at the beginning of the pandemic; however, more extensive research is needed to follow-up on the current situation, 1 year later.

Conflict of interest

The authors declare no conflict of interest.

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