

Survey Showed No Change in Dog Behavior or Quality of Life Since Onset of Covid-19

by

Patrick P. Callagy

A THESIS

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Oregon State University

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Honors Baccalaureate of Science in Biology

(Honors Scholar)

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Abstract approved:_____

Michelle Kutzler

Abstract

The Covid-19 pandemic has affected everyone in the world to some degree through social isolation and a changing of the norms, including the number of deaths. However, no research has been done on how companion dogs in the United States have been affected by these societal changes. Research in Israel, Spain, and the United Kingdom show conflicting results on whether social changes from Covid-19 have changed the human-animal bond. This thesis research surveyed dog owners within the United States to see if the quality of life or behavior of their dogs has changed since the onset of Covid-19. A Qualtrics survey was developed and distributed via social media. Responses (n=1422) were analyzed using chi-square tests of independence and descriptive statistics. The Covid-19 pandemic did not seem to have any effect on the quality of life or behavior of companion dogs, even though owners spent more time with their dogs during the pandemic. These findings allow the United States to join the international conversation on how Covid-19 affected the owner and dog relationship.

Key Words: animal welfare, dog adoption, human-animal bond, Qualtrics, SARS-CoV-2 virus

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I understand that my project will become part of the permanent collection of Oregon State University, Honors College. My signature below authorizes release of my project to any reader upon request.

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Introduction

In late December 2019, several local health care facilities in Wuhan, China reported clusters of patients with pneumonia from an unknown cause [1]. The cause of this pneumonia was later identified as the SARS-CoV-2 virus (also known as Covid-19). Because of its rapid worldwide spread by March 2020, the World Health Organization classified this virus as a global pandemic [2]. Although vaccines are becoming available to prevent further transmission of Covid-19 and life is gradually returning to “normal”, this virus has left a lasting impact on society throughout the entire world.

During periods of quarantine from Covid-19, humans were forced into social isolation. Social isolation increases stress in humans, which is manifested by increased morbidity and mortality [3]. For many people, dogs help relieve stress by providing emotional support [4]. Dog companionship can also decrease depression and anxiety in humans [5]. During the Covid-19 pandemic, dogs have alleviated their owners’ mental stress from loneliness [6]. However, the mental state of the dogs is largely ignored in this relationship. Since March 2020, shelters in the United States have been unable to keep up with the demand for dog adoption [7], which has exceeded 1.6 million dogs adopted annually from shelters in previous years [8].

Similar to humans, dogs are social animals and the behavior of the members of their family/pack (e.g. mood of their owner) can drastically affect dog health and behavior [4]. For example, concentrations of cortisol (a hormone released from the adrenal cortex during times of stress) in owners is directly associated with cortisol concentrations in their dogs [9] or vice versa. Therefore, when owners are stressed (e.g., during a global pandemic), it would be expected that dogs will also be stressed, and their quality of life might exhibit traits that indicate decline.

The quality of life of a dog is determined by a variety of factors, ranging from physical health, mental health, and ability to socialize [10]. It is important to mention that what makes a “good” quality of life in dogs varies considerably when interpreted by owners. Surveyed dog owners in previous years report no dogs with a low quality of life [11]. However, a perceived decrease in a dog’s quality of life is a common reason why owners consider euthanasia for their pets [12], even if there are other causes.

A dog’s quality of life can be affected by the amount of time owners spend actively engaging with them. Bored dogs have decreased cognitive function [13]; whereas dogs whose owners played with them or gave them an unexpected treat were healthier [14]. Active engagement with dogs also improves the dogs’ temperament and relationship with their owners [15]. During periods of social isolation, many owners increased the active engagement time with their dogs, and this leads to concerns of a high probability of separation-related behavioral problems with dogs once human life returns to “normal” [16].

Dog behavior can be influenced by factors such as genetics, background, and its social relationships; which is very similar to humans [17]. However, unlike humans’ understanding behavioral problems in dogs means the humans doing more observation rather than requesting the information directly. The visual signs of behavioral changes in dogs are usually very easy for owners to see as they present in clear and sometimes drastic ways. In one Italian study over half of the respondents to a survey on perception of dog stress reported whining, aggressiveness, and extensive barking as some of the behavioral indicators [18]. Similarly, when dogs are stressed they will sometimes lash out in clear ways, such as biting. For example, the introduction of Covid-19 public health measures (e.g. lockdowns) in the United States correlated with the threefold increase in dog bites seen by emergency rooms [19].

The consequences of the Covid-19 pandemic have been prevalent throughout the world as social isolation, travel bans, and “shelter in place” orders have caused sudden changes in human activity [20]. In Israel, a study was done to observe how the human-dog relationship had been affected by Covid-19 by a survey sent out to dog owners, and retrospective Google Trend data, and data from an Israeli pet adoption website [21]. However, this correlation might be different in other countries, such as the United States. Unlike Israel the United States did not have a federally set time for national lockdown as each state had its own response to the pandemic. Regardless, most states had some version of a “lockdown” by the end of March 2020, when the global pandemic was announced [22].

It is important to understand how Covid-19 has affected the bond between humans and their dogs so that the United States can join the international conversation. In previous disasters, such as the Great Recession of 2008 and 2009, the United States saw a clear increase in rates of dog ownership though little research was done into specifically how the bond had changed [23]. The Covid-19 pandemic, being an even more far-reaching disaster, likely affected the bond between humans and dogs.

Hypothesis

The Covid-19 pandemic will change the quality of life and behavior of pet dogs in the United States.

Objective

The objective of the research was to test this hypothesis by surveying pet dog owners in the United States in March 2020 and March 2021 to determine whether or not dogs and dog owners were affected by the Covid-19 pandemic.

Methods

Collection of Google Trends Data

The popularity of internet queries in the United States for the keywords “dog adoption”, “face masks”, or Covid-19” over the past five years (March 6, 2016 to February 14, 2021) was determined using the Google Trends website (<https://trends.google.com/trends/?geo=US>). Data for each keyword was individually downloaded into a spreadsheet and overlaid for comparison (Microsoft Excel 2021).

Survey Development and Distribution

Survey questions were designed to request information on dog ownership and Covid-19 topics as of March 2020 and their status of dog ownership as of March 2021. The survey consisted of a total of twenty-six “yes-no” or “select the best answer” questions. However, an individual respondent would only be presented with one question if they did not currently own a dog and with 14 questions if they got a dog after March 2020. The survey questions are listed in the Appendix. The questions were formatted into an online survey utilizing Qualtrics (Qualtrics, Provo, UT) and respondents could not continue the survey without answering each question in order. Test surveys were created and distributed in order to troubleshoot problems before the survey was distributed. Surveys that were begun but not completed after a week were deleted based on Qualtrics own settings. A request to respond to the survey was distributed via social media (Facebook and LinkedIn) with specific language asking recipients to repost or share the message. The online survey was active from February 17, 2021 to March 12, 2021.

Data Analysis

A total of 1530 surveys were received. In the event of duplicate responses, as determined from the same IP address, only the first completed survey was used, and the remainder were excluded from the data analysis (n=37). Surveys that were not completed were also excluded from the data analysis (n=71). Therefore, 1422 responses were used for the data analysis. The average time to complete the survey was 9.58 minutes. Descriptive statistics generated in Microsoft Excel were used to evaluate the data. Additionally, for paired data (questions that were answered for both time periods of the study), a chi-square test of independence was done. Significance was defined as $p < 0.05$.

Results

Google Trends data are summarized in **Figure 1** and **Figure 2**. There was an increase in the popularity of searches for all three keywords on March 15, 2020. There was an approximate 40% increase in the number of searches for the keyword “dog adoption”, which remained at least 20% increased until February 14, 2021. Based upon the responses to this survey, 11.2% of respondents reported getting a dog within this time frame.

Ninety-seven percent of respondents currently owned a dog. Of those respondents that currently owned a dog, 88.8% acquired their dog before March 2020 and 45% of respondents owned their dog for at least five years (**Figure 3**). Of the respondents that acquired a dog after March 2020, 40% percent had been thinking about acquiring a dog for a while (**Figure 4**). Respondents could select “Other” reasons for acquiring a dog and these responses were categorized (**Table 1**).

Eighty-eight percent of respondents answered questions about March 2020 while all respondents answered questions concerning March 2021. Less than 1% of respondents who had a dog in March 2020 no longer had a dog in March 2021. Fifty-one percent of respondents said their dog was five years or older in March 2021 (**Figure 5**) and 92% of respondent’s dogs were either spayed or neutered.

Forty-eight percent of respondents had to quarantine because of the Covid-19 pandemic (**Figure 6**) but the length of quarantine varied among respondents (**Figure 7**). For those that had to quarantine, 90% changed their daily routine. Concurrently, there was an increase in the time that respondents spent actively engaged with their dog (e.g. play) from March 2020 to March 2021 (**Figure 8**). A reasonable assumption has been made that since owners had more time at home alone, they had more time to spend with their dogs.

Most respondents stated that their dog's quality of life in March 2020 was high (over 7 out of 10; where 10 is the very best quality of life) (**Figure 9**). Additionally, in March 2021, about an equal number of respondents saw no change in their dog's quality of life or said it had improved (**Figure 9**), and this was not affected by length of dog ownership (**Figure 10**). Respondents were less worried about how Covid-19 affected their own health in March 2021 when compared to March 2020 ($p=0.00001$) (**Figure 11**). Additionally, the respondents' personal income from March 2020 and March 2021 was not affected by Covid-19 ($p=0.2238$) (**Figure 12**). However, the respondents' concern with their own health and personal income was not correlated with the dog's quality of life. Interestingly, respondents reported higher quality of life levels for their dog regardless of how much time they had to quarantine (**Figure 13**).

Most respondents stated they walked their dog 0-2 times a day in March 2020 and March 2021 (**Figure 14**). The number of times a day the dogs were walked did not change significantly ($p=0.2238$). Most respondents walked their dog for at least a half mile walk each day (**Figure 15**) and the average length of dog walks each day did not change between March 2020 and March 2021 ($p=0.5572$). Not including dog walks, most respondents increased active engagement (e.g., play) with their dogs after March 2020 (**Figure 8**). Ninety-nine percent of respondents allow their dog to sleep inside.

Most respondents said there were no new behavioral challenges exhibited by their dogs between March 2020 and March 2021 (**Figure 16**). Respondents could choose "Other", and text enter their answers. These "Other" answers for changes in dog's behavior were categorized (**Table 2**). The length of the daily dog walks influenced the new behavioral challenges exhibited ($p<0.00001$) (**Figure 17**). Time spent in quarantine (**Figure 18**) and amount of walks that the

dog takes a day in March 2021 (**Figure 19**) had no correlation on new behavioral challenges in the dog ($p=0.6107$ and $p=0.6403$, respectively).

Category of Responses	Number of Responses
Previous Dog's Death	21
Being at home more	10
Fostered Dog Before Rescuing/Adopting	7
Emotional Support	5

Table 1: Categories of write in responses to the question “Why you got a dog during Covid-19?”

Category of Responses	Number of Responses
More clingy	65
Separation anxiety	48
More barkative/ protective	15
Better behaved	14
Less obedient or decreased socialization	11
Quality of life decreased because of age/ health reasons	9

Table 2: Categories of write-in responses to the question “Has your dog exhibited any new behavioral changes in March 2021?”

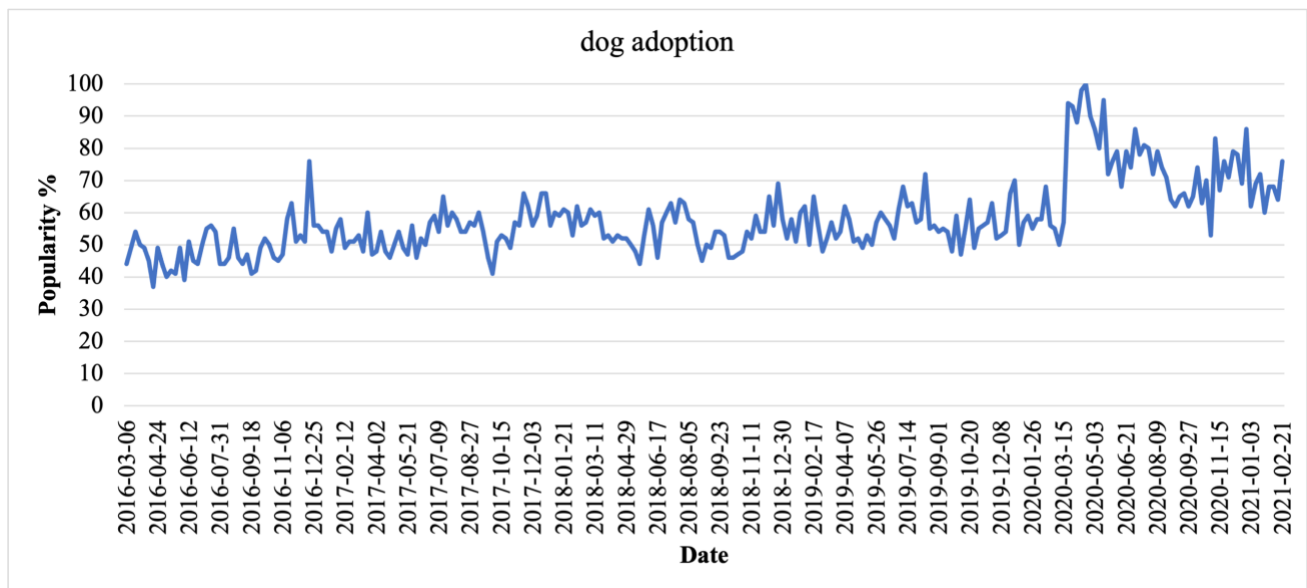


Figure 1: Google Trends data from March 6, 2016 to February 14, 2021, illustrating the rise in popularity of search term “dog adoption”.

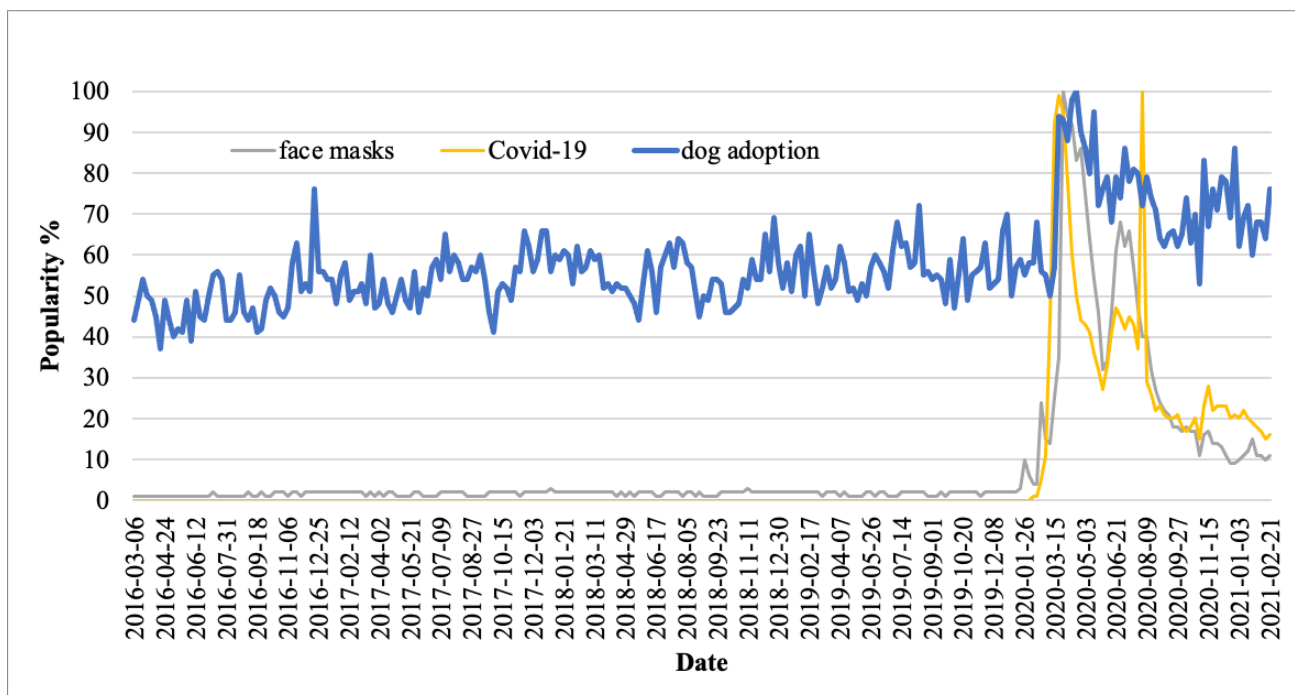


Figure 2: Google Trends data from March 6, 2016, to February 14, 2021, illustrating the concurrent rise in popularity of search terms “dog adoption”, “face masks”, and “Covid-19”.

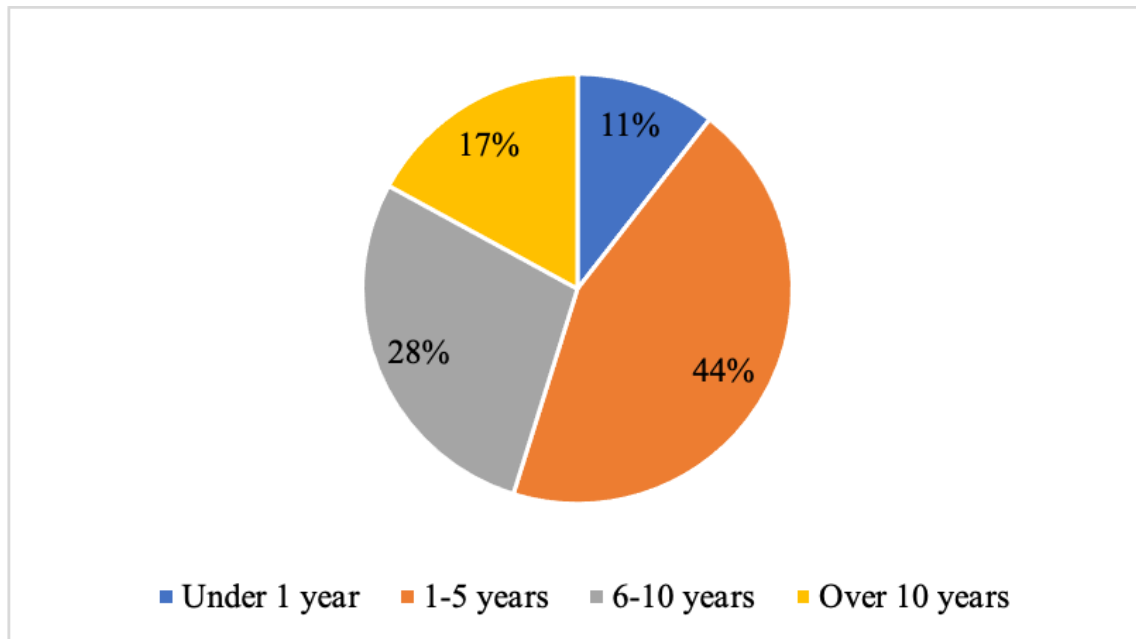


Figure 3: Length of time respondents owned their dog as of March 2021.

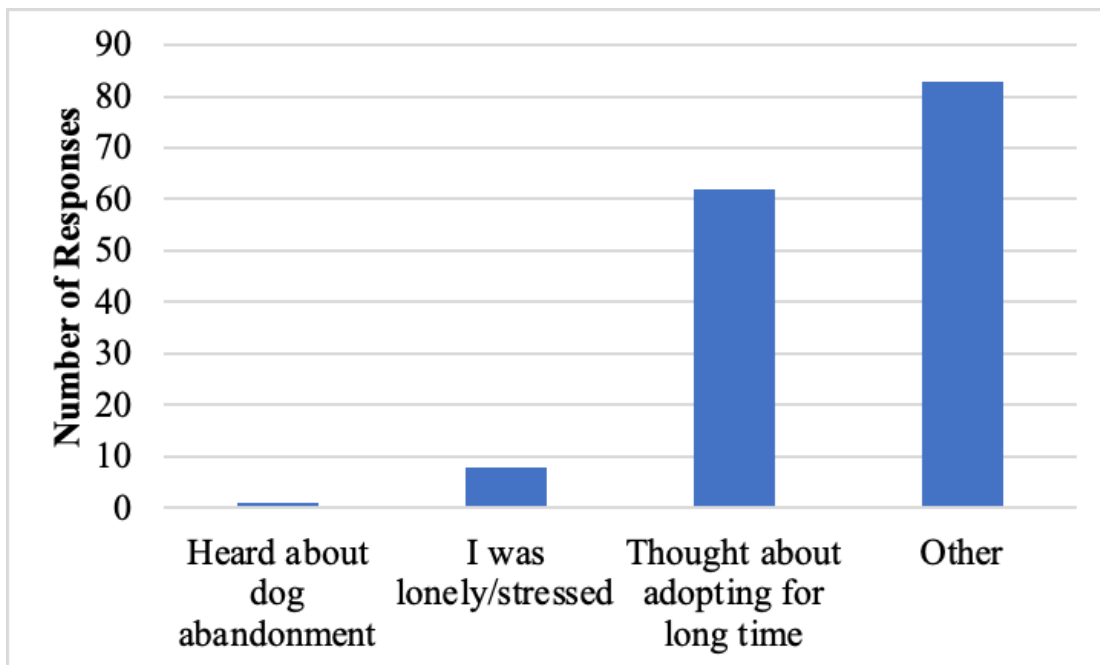


Figure 4: The reasons provided by respondents for why they got a dog during Covid-19.

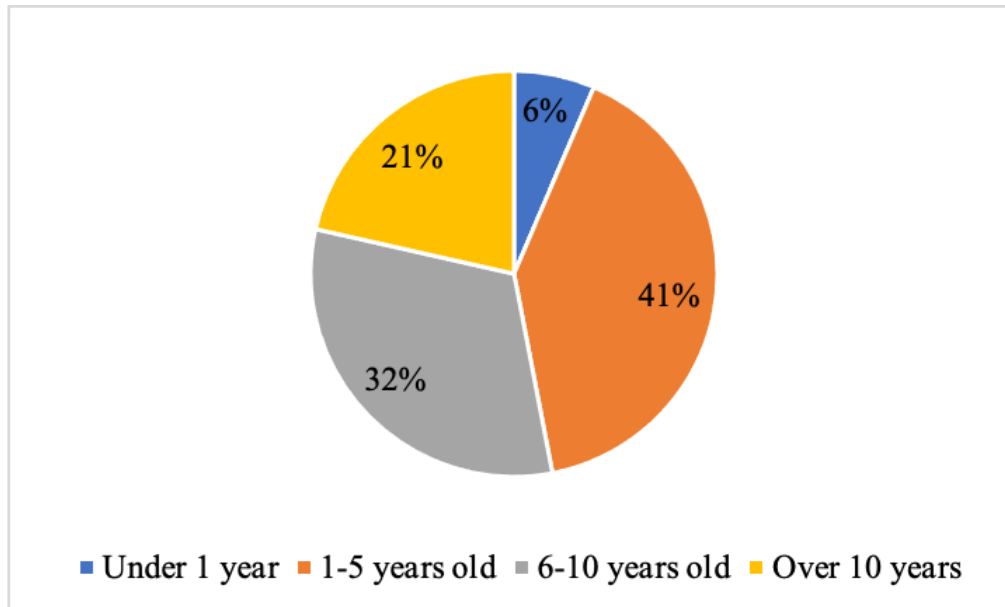


Figure 5: Age of dogs owned by respondents as of March 2021.

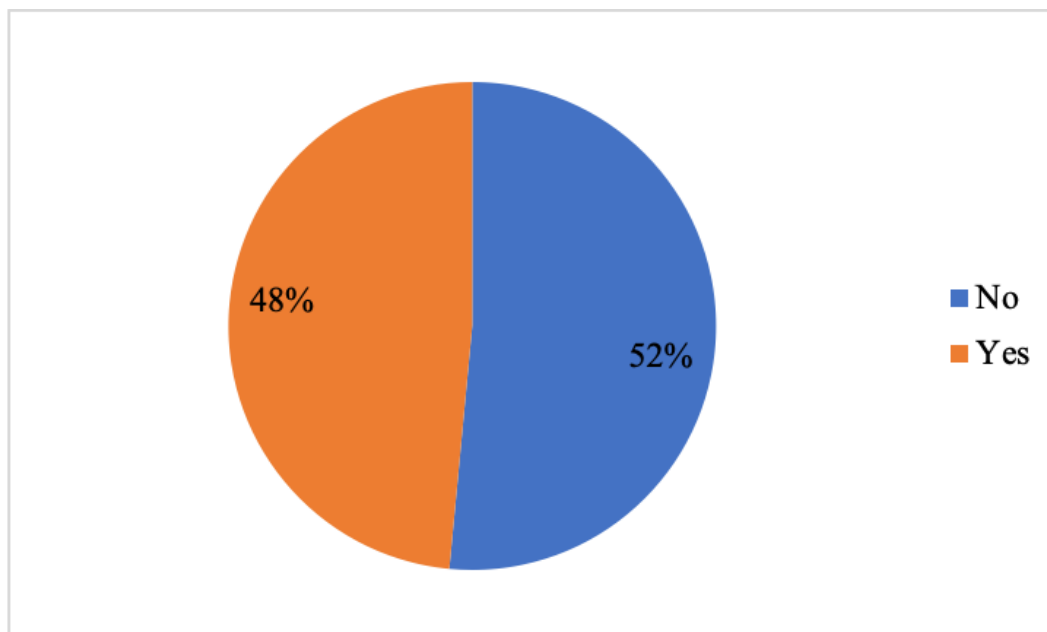


Figure 6: Percentage of respondents that had to quarantine in March 2020.

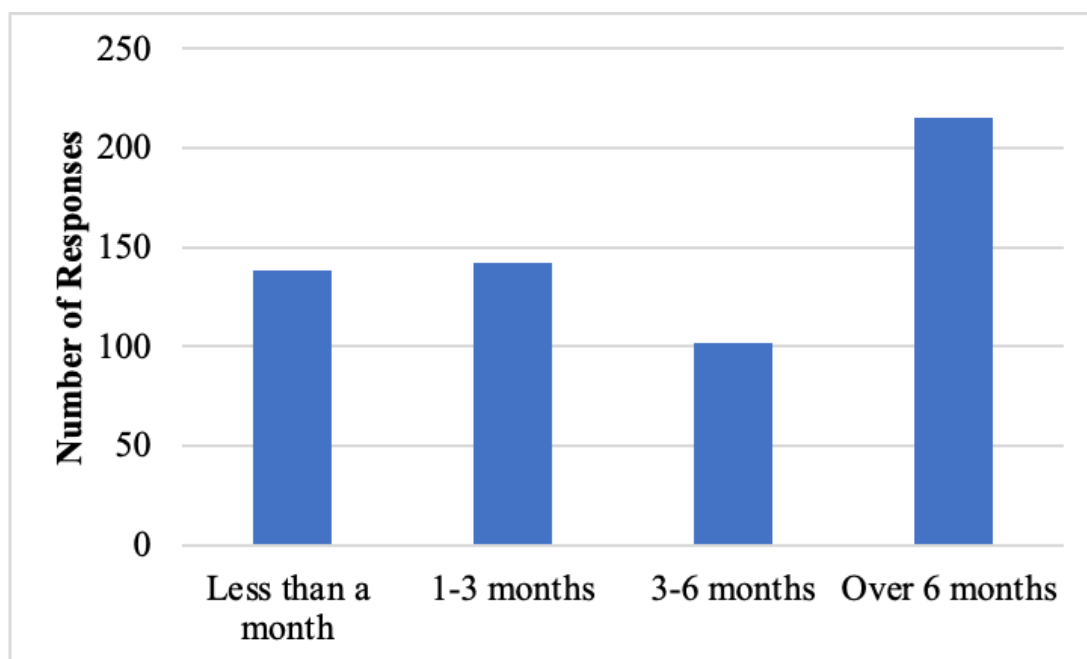


Figure 7: Length of time respondents had to quarantine beginning in March 2020.

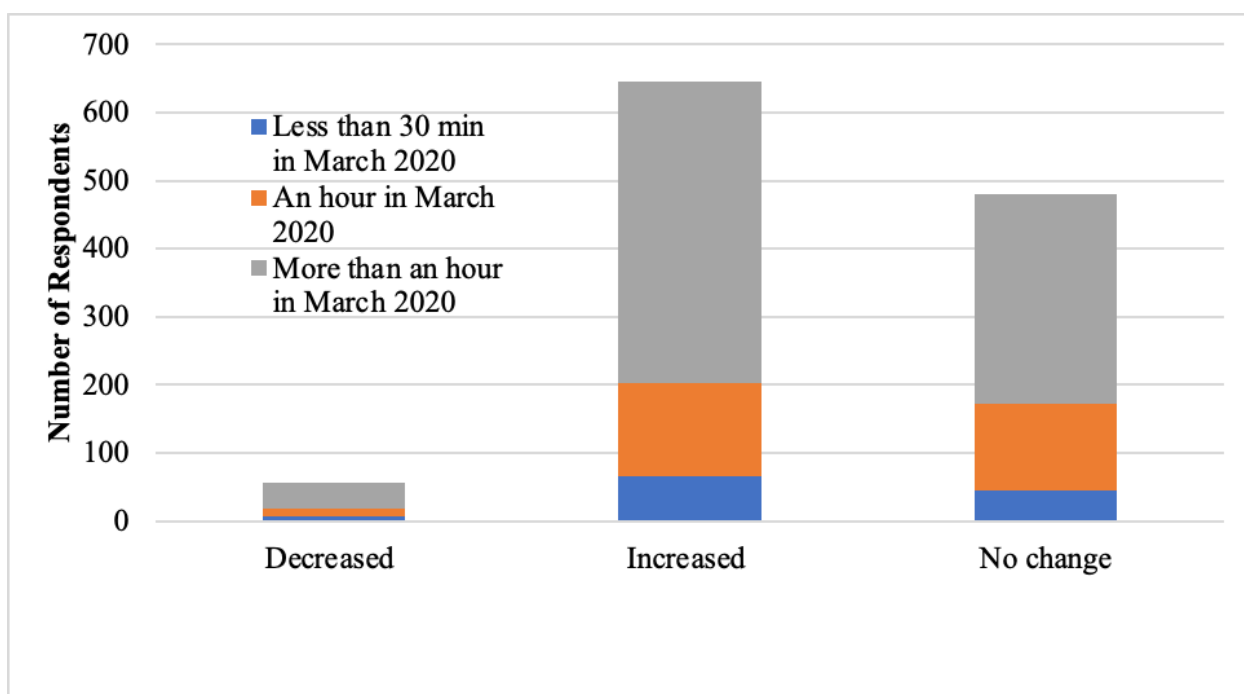


Figure 8: The change in the amount of time respondents actively engaged with their dogs (not including walks) in March 2021 compared with March 2020.

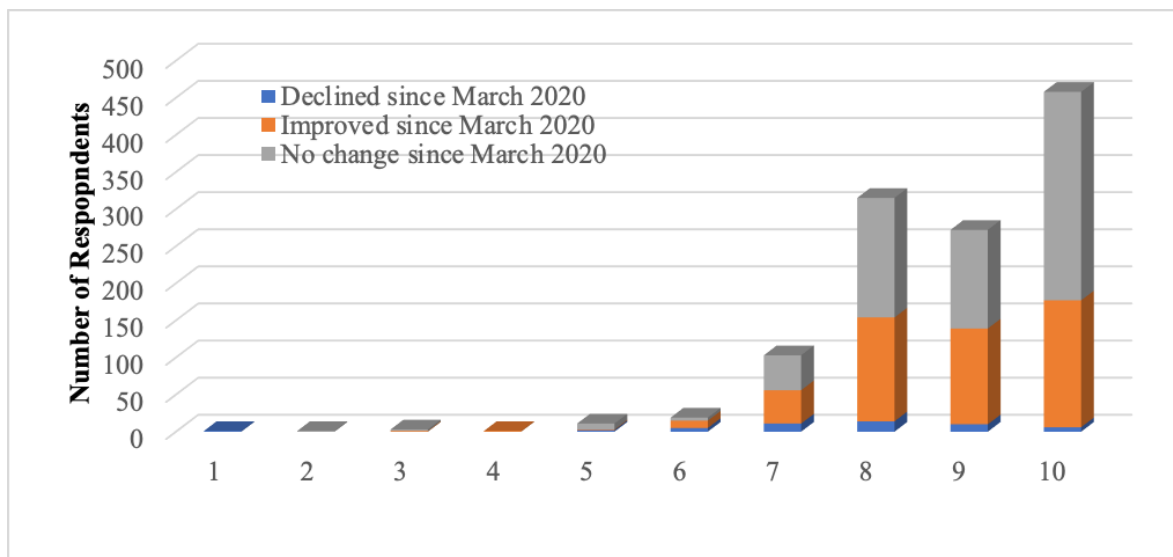


Figure 9: Dog's quality of life in March 2020 according to respondent (where 10 = very best quality of life).

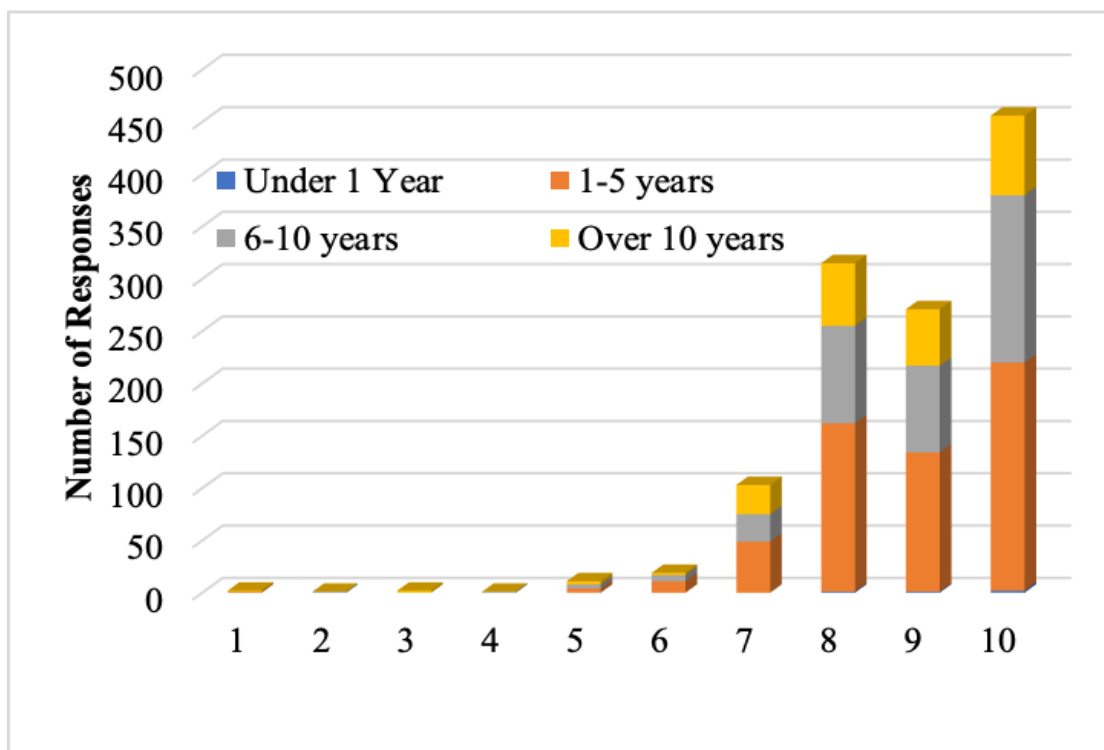


Figure 10: Dog's quality of life in March 2020 according to respondent (where 10 = very best quality of life) connected amount of years owner has had the dog.

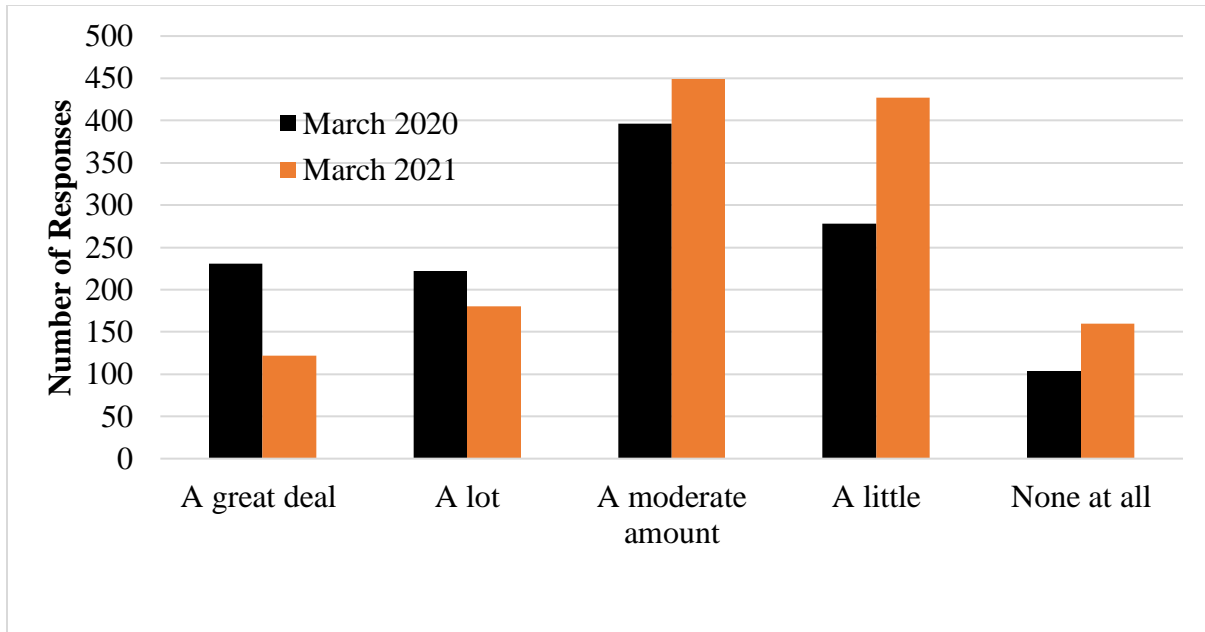


Figure 11: Respondents' concerns about their own health between March 2020 and March 2021.

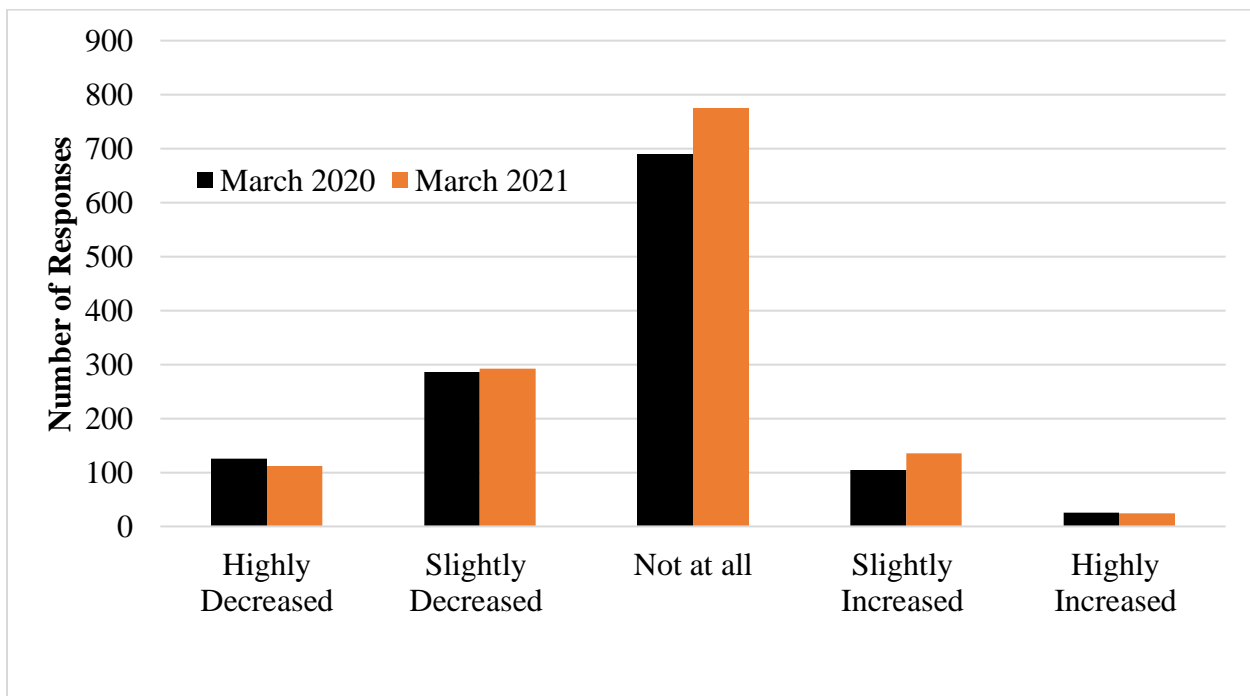


Figure 12: Changes in respondents' personal income between March 2020 and March 2021.

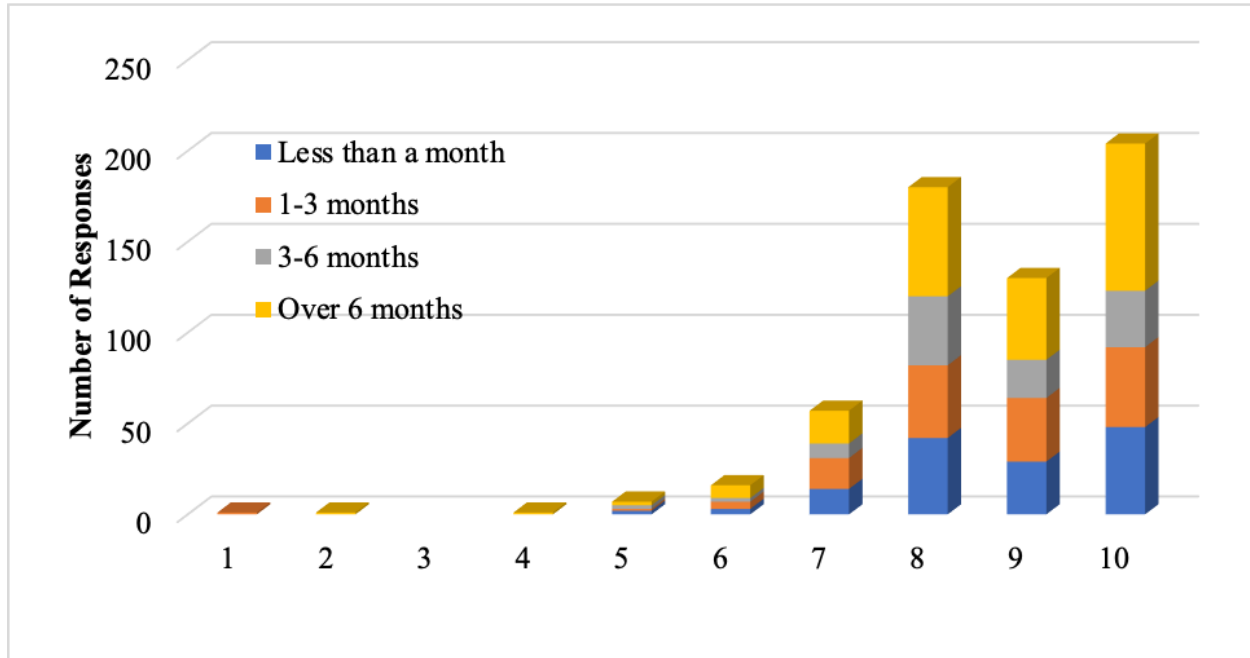


Figure 13: Effect of the amount of time the respondent had to quarantine on the dog's perceived quality of life (where 10= very best quality of life).

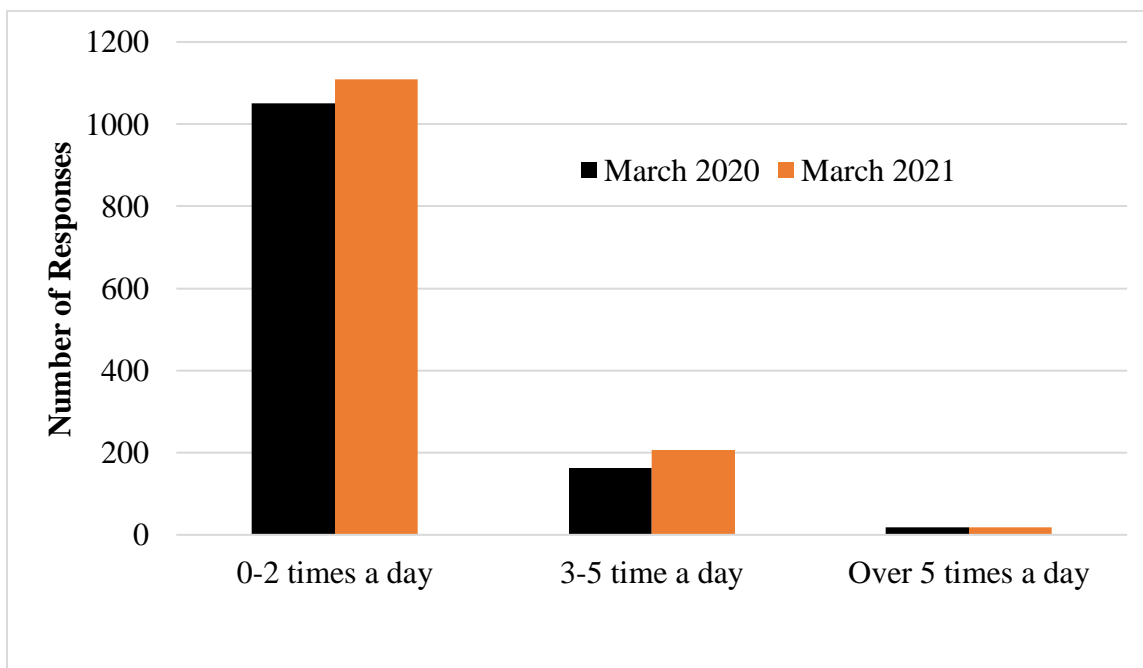


Figure 14: Number of dog walks each day did not differ between March 2020 and March 2021.

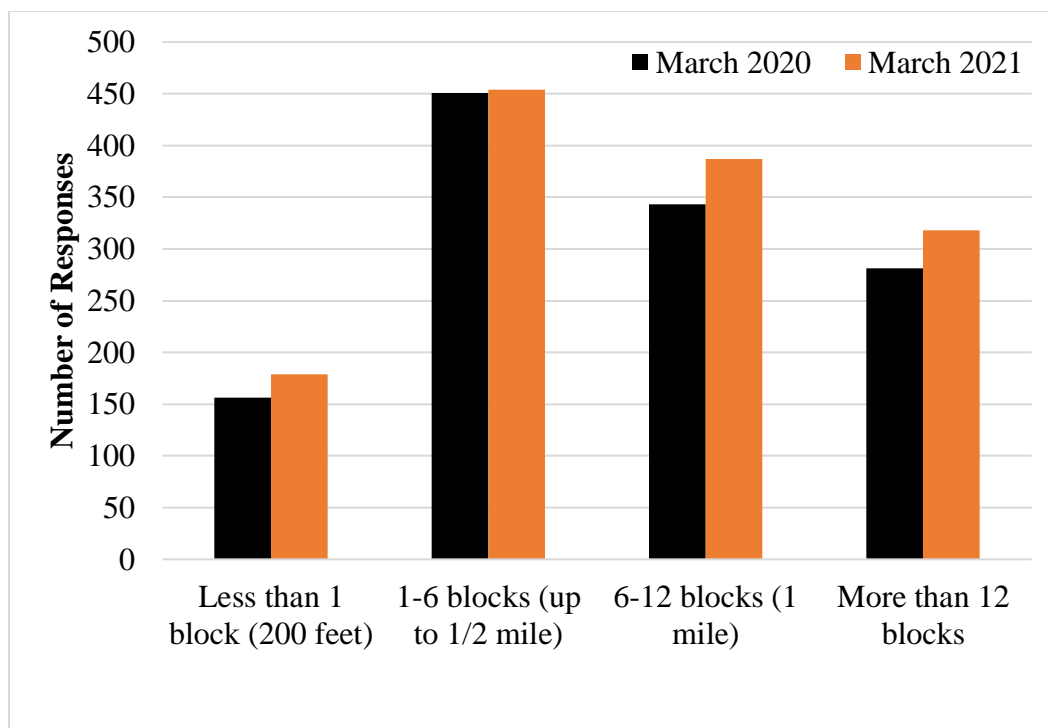


Figure 15: Length of dog walks did not differ between March 2020 and March 2021.

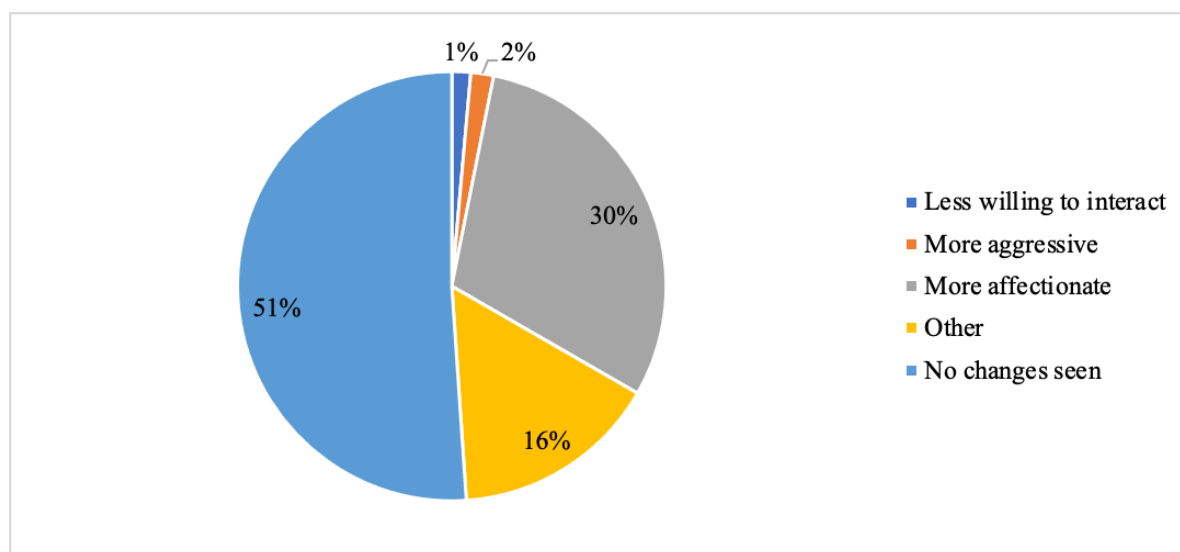


Figure 16: Responses to the question of “Has your dog exhibited any new behavioral changes in March 2021?”

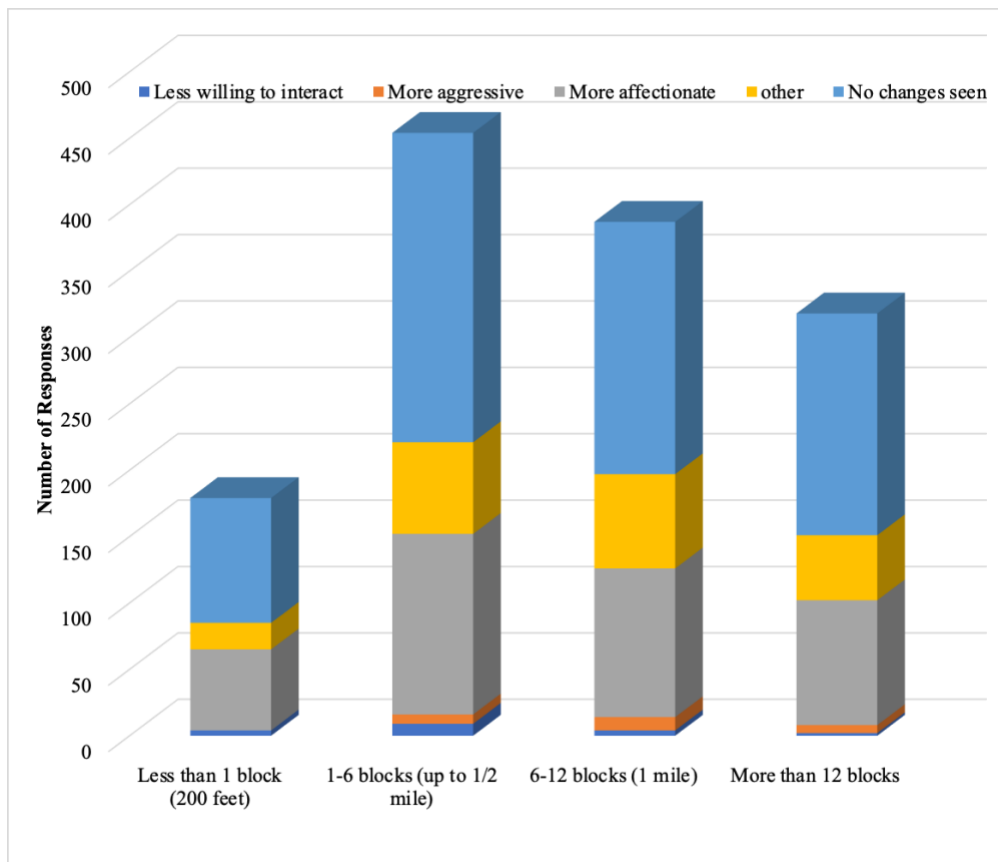


Figure 17: Correlation of the length of the daily dog walks on new behavioral challenges exhibited.

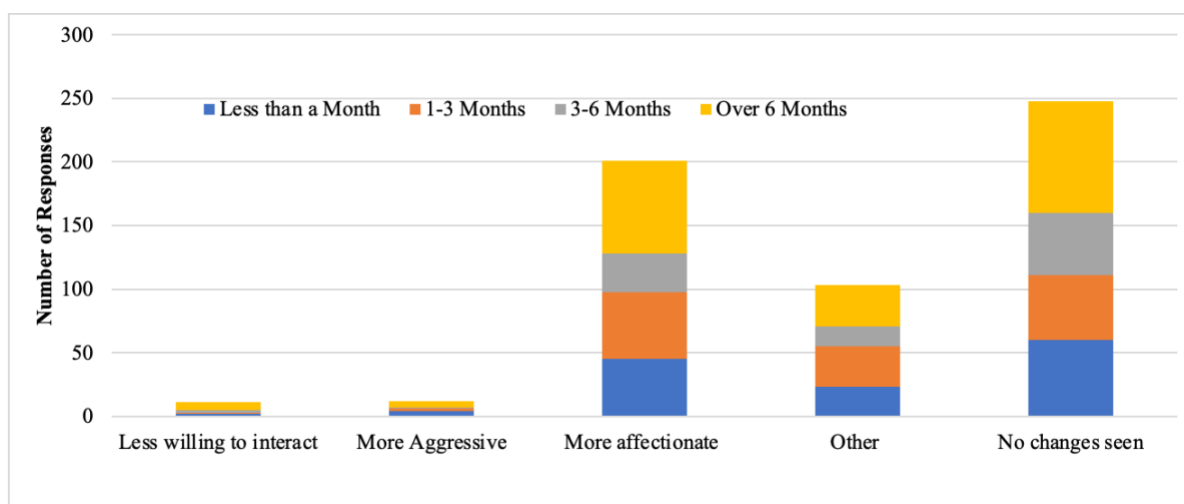


Figure 18: Correlation of length of quarantine on behavior challenges exhibited by dogs.

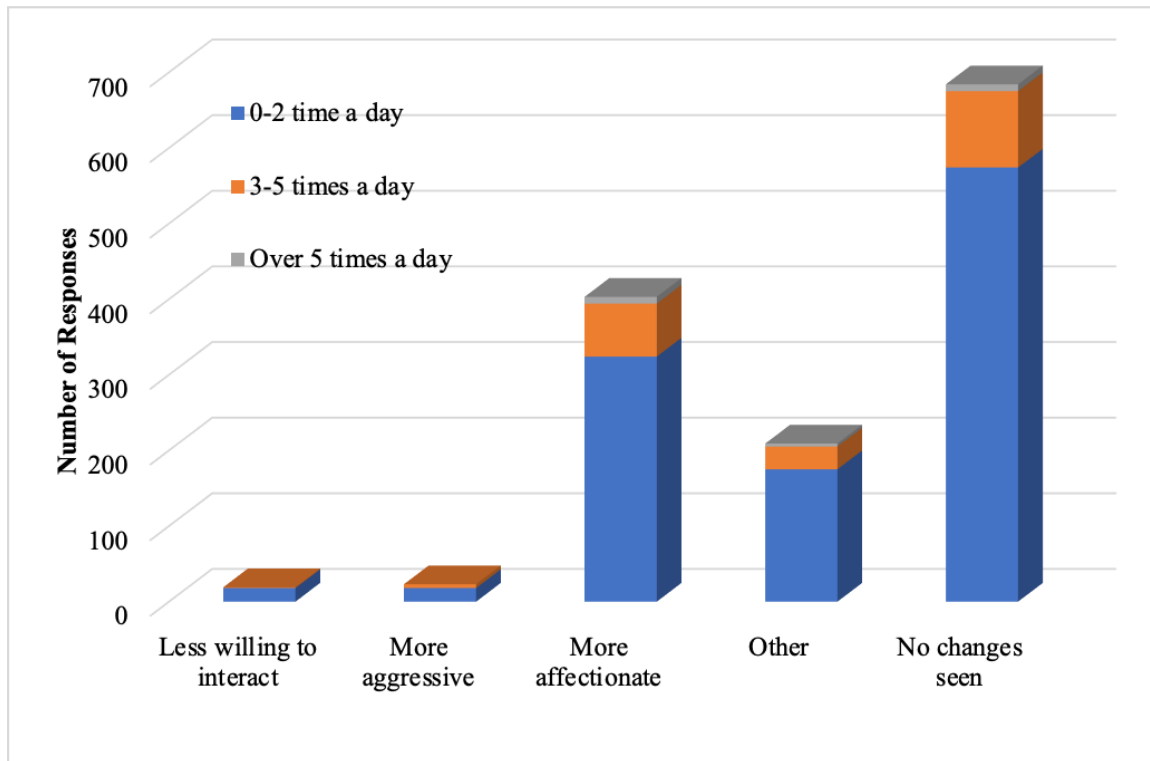


Figure 19: Effect of the number of walks per day on behavior challenges exhibited by dogs.

Discussion

Previous research from Israel has reported a spike in popularity of the internet search words “dog adoption” at the beginning of the Covid-19 pandemic [21]. A similar increase in popularity of these search terms was also observed in the current study but after the initial spike, the increase was sustained in the data from the United States (**Figure 1**), unlike the search terms “Covid-19” and “face masks” (**Figure 2**). This increased interest in dog adoption was reflected by 11.2% of respondents indicating that they had gotten a dog since March 2020. However, since March 2020, thousands of U.S. servicemen and women have returned to the country. The increase in search for the terms “dog adoption” may have partially reflected interest by returning military to adopt a dog. Research has shown that veterans coming back from the isolation of war and suffering from PTSD reintegrate better into society by relying on a partnership between them and their service dogs [24].

In Spain, 28.8% of dog owners surveyed between March and April 2020 said their relationship with their dog improved during Covid-19 mandated confinement [25]. These results are in contrast with the current study, in which twice as many respondents (56%) said they increased the amount of time they actively engaged with their dog between March 2020 and March 2021. This may have occurred because the respondents in the current study have been home with their dogs for a longer period, allowing owners to form a closer connection with their dogs. This is supported by a survey conducted in the United Kingdom during the first Covid-19 lockdown that reported that dogs that had more play/training sessions with their owners had a closer bond with their owners [26].

In Israel, 25% of dog owners surveyed in April 2020 said that they were very concerned about their personal health [21]. This is similar to 19% of respondents from the current study that

were worried a great deal about their health in March 2020. However, only 9% of respondents in the current study were worried a great deal about their health in March 2021. This difference between the two time periods could be due to fatigue as the Covid-19 pandemic continued. The loss of activities and social relations can cause a variety of emotions for people who know the risks of Covid-19 but reject the restrictions [27]. This also leads to decreased worry about an individual's health as the length of time of the pandemic continues to grow.

Similar to health concerns just mentioned, 22.9% of participants in the Israel study reported that their personal income was severely damaged from Covid-19 [21]. However, in the current study, only 8% and 10% of dog owners in the United States stated their income was highly decreased in March 2020 and March 2021, respectively. This difference could be due to the compensation that each country gave to their citizens during the pandemic. For example, in Israel 57% of respondents that had high incomes before the pandemic stated that they would not comply with government restrictions if they were not compensated for lost wages sustained during the lockdown [28]. However, in the United States the majority of people who benefited from the compensation for lost wages were those of poorer communities, via the Covid-19 relief legislation [29].

Most dog owners (54.6%) surveyed report a high quality of life for their dogs, with no dog owners responding that their dogs have a low quality of life [30]. This is consistent with what was observed in the current study as 97% of respondents said their dog's quality of life was high (7 to 10, with 10 being the highest quality of life). However, 62.1% of respondents from Spain considered their dog's quality of life had gotten worse since Covid-19 confinement [25]. They demonstrated that for every one-point decrease in quality of health for the owner, the dog was 1.3 times more likely to be poorly coping with confinement [25]. This differs from the

results of the current study that demonstrated the owners' concern about their health did not significantly affect the dog's quality of life (**Figure 9 and Figure 11**). Due to the categorical data used in this study, a power analysis could not be performed to determine what sample size would be needed to demonstrate significance. However, the sample size used in the current study was similar to the sample sizes used in similar studies from other countries.

In Israel, the number of respondents who did not recognize new behavioral problems in their dogs during Covid-19 was low, only 11.6% [21]. For those who noticed behavior changes, the most common behavior was increased attention by the dog to the person [21]. In Spain, 29.5% of respondents reported no significant change in their dog's behavior during confinement though the most common behavior reported in confinement was attention seeking (42.6%) [25]. These results agree with the current study in which 51% of respondents saw no new behavioral challenges from their dog since March 2020 and the most common behavior change noticed was the dogs being more affectionate or "more clingy" (**Figure 16 and Table 2**).

In the United Kingdom, new undesirable dog behaviors were reported since March 2020, including increased vocalization when left alone and the dog being "clingy" [31]. However, in this study increased dog walking during periods of social isolation resulted in an increase in the human-dog bond [31]. In the current study, length of dog walks was correlated to dog behavioral problems (**Figure 17**). However, there was no significant difference in the length or amount of dog walks between March 2020 and March 2021 (**Figure 14 and Figure 15**). Similar results were found in Spain where the average number of dog walks taken before and during confinement did not change significantly [25].

Since the survey was sent out via social media and only available where internet was available, some dog owners may not have been able to participate. In addition, the author's

personal accounts were utilized to send out the survey, which may have limited the extent of the survey distribution. However, there were 1422 number of responses, which is comparable to similar surveys in Israel (2906 responses), Spain (1297 responses), and the United Kingdom (6004 responses).

The longer the time since a memory occurred, the more likely the memory will be distorted [32]. This can result in memory bias (having altered forms of memories after certain periods of time) and could have affected some of the responses. In addition, response bias (when participants respond falsely or inaccurately to questions) may have existed. Even though responses were anonymous, there is a prevalent tendency for people to present a favorable image of themselves on self-reporting surveys (known as socially desirable responding (SDR)) [33]. For example, respondents may have been more inclined to answer questions that reflected a positive light on them (e.g., putting a “quality of life” score of 10 for their dog). Despite these sources of bias, the results from the current study were highly comparable to those conducted over similar time periods in Israel, Spain, and the United Kingdom.

Conclusion:

A majority of dog owners during the Covid-19 pandemic recorded no change in their dogs' quality of life since March 2020. Additionally, length of quarantine and dog ownership were also shown to have no effect on the quality of life of the dog. A high number of respondents saw no new behavioral challenges in their dogs, though behavior was affected by length of dog walks. Owners were seen to increase active engagement, not including dog walks, with their dogs during the Covid-19 pandemic lockdown.

One limitation of this study is that the results may not have represented the entire United States. Future comparisons of owners and their dogs' relationship during Covid-19 should include identifying which state the respondent was from. Additionally, it would be interesting to follow up with the participants of the current study in March 2021 after the majority of individuals have been vaccinated and the Covid-19 pandemic isolation has become less severe. Long-term stress is paralleled between dogs and their owners, so the full and long term effects of social isolation on their relationship are likely not currently known [34].

In the current study, 11.2% of respondents had gotten their dog during the social isolation period of the pandemic. As a result, for many dog-owner relationships, constant interaction with their owners is all that is known to dogs with this owner. As more individuals are getting vaccinated against Covid-19 and then return to their “normal” day to day activities, it will be interesting to observe if any behavioral changes develop in companion dogs. There are multiple studies that have indicated separation anxiety is common when the dog observes the owner's real or perceived absence, leading to behavioral challenges [35,36]. We have already seen how many of these “pandemic pups” are being relinquished back to shelters throughout the United States now that lockdown measures are being relaxed [37,38].

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Appendix: Pet Survey for Covid-19 Pandemic

The purpose of this study is to investigate how the Covid-19 pandemic has affected the dog and human bond. This survey includes questions about your relationship with your dog as of March 2020 and at this time. If you have more than one dog, please answer the questions based on the dog you have owned the longest.

The survey should take approximately 5-10 minutes to complete. Your participation in this survey is completely voluntary and there are no identified risks of participating in this study. No sensitive information will be collected by this survey and anything that is collected will be kept confidential. Participating in this study does not mean that you are giving up any of your legal rights.

For further information about this study or to report any concerns, please contact Patrick Callagy at callagyp@oregonstate.edu

Q1 Clicking "agree" below indicates that I have read the description of the study, I am over 18, and I agree to participate in the study.

☐ Agree ☐ Do not agree

Q2 Do you currently have a pet dog?

☐ Yes ☐ No

Q3 When did you acquire that dog?

☐ Before March 2020 ☐ During or after March 2020

These next set of questions are asking about **your experience in March 2020.**

Q4 To what extent were you worried about your health because of the Covid-19 pandemic?

- ☐ A great deal ☐ A lot
- ☐ A moderate amount ☐ A little
- ☐ None at all

Q5 How did the Covid-19 pandemic affect your personal income?

- ☐ Highly Increased ☐ Slightly Increased
- ☐ Not at all ☐ Slightly Decreased
- ☐ Highly Decreased

Q6 How many times a day did you walk your dog?

- ☐ 0-2 times a day ☐ 3-5 time a day ☐ Over 5 times a day

Q7 What was the average length of dog walks?

- ☐ Less than 1 block (200 feet) ☐ 1-6 blocks (up to 1/2 mile)
- ☐ 6-12 blocks (1 mile) ☐ More than 12 blocks

Q8 Not including walking your dog, how much time did you spend actively engaging with your dog?

- ☐ Less than 30 min ☐ An hour ☐ More than an hour

Q9 How would you rate your dog's quality of life? (where 10 is the absolute best quality of life.)

☐ 0 ☐ 1 ☐ 2

☐ 3 ☐ 4 ☐ 5

☐ 6 ☐ 7 ☐ 8

☐ 9 ☐ 10

Q10 Did you or your family have to quarantine?

☐ Yes ☐ No

Q11 How long did you have to quarantine in your area?

☐ Less than a month ☐ 1-3 months

☐ 3-6 months ☐ Over 6 months

Q12 Did your daily routine change during quarantine?

☐ Yes ☐ No

Q13 Do you still have your dog?

☐ Yes ☐ No

These next set of questions are asking about your **experience at the time of taking this survey.**

Q14 To what extent are you worried about your health because of the Covid-19 pandemic?

- ☐ A great deal ☐ A lot
- ☐ A moderate amount ☐ A little
- ☐ None at all

Q15 How has the Covid-19 pandemic affected your personal income?

- ☐ Highly Increased ☐ Slightly Increased
- ☐ Not at all ☐ Slightly Decreased
- ☐ Highly Decreased

Q16 How many times a day do you walk your dog?

- ☐ 0-2 times a day ☐ 3-5 time a day ☐ Over 5 times a day

Q17 What is the average length of dog walks?

- ☐ Less than 1 block (200 feet) ☐ 1-6 blocks (up to 1/2 mile)
- ☐ 6-12 blocks (1 mile) ☐ More than 12 blocks

Q18 Not including walking your dog, how has the amount of time you have actively engaged with your dog changed?

- ☐ Increased ☐ No change ☐ Decreased

Q19 Has your dog's overall quality of life changed?

☐ Improved ☐ No change ☐ Declined

Q20 Has your dog exhibited any new behavioral changes?

☐ More aggressive ☐ Less willing to interact

☐ More affectionate ☐ No changes seen

☐ Other _____

Q21 How old is your dog?

☐ Under 1 year ☐ 1-5 years old

☐ 6-10 years old ☐ Over 10 years

Q22 How many years have you owned the dog?

☐ Under 1 year ☐ 1-5 years

☐ 6-10 years ☐ Over 10 years

Q23 Is your dog spayed/neutered?

☐ Yes ☐ No

Q24 Does your dog live inside the house?

☐ Yes ☐ No

Q25 Do you own more than one dog?

☐ Yes ☐ No

Q26 Why did you get a dog during the Covid-19 pandemic (select best answer)?

☐ Heard about increased dog abandonment and thought I should help

☐ I was lonely or stressed and thought adopting a dog may help

☐ Thought about adopting for a long time and the Covid-19 pandemic seemed like good time

☐ Other _____

