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Assessing the Validity of Preconceptions about Dog Parks: Cleanliness and Disease Transmission

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By

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Introduction:

All breeds of dog require at least some outlet of energy and mental stimulation; exercise such as walking, running, fetching, playing, and tracking offer ways to satisfy both requirements (AKC 1996). Exercise in canines has been shown to contribute to maintenance of a healthy weight, healthier mental state, and decrease of unwanted, destructive behaviors (Herron et al 2009, AKC 1996). These benefits also extend to humans, who are less likely to develop type II diabetes, cardiovascular disease and mental illness if they are physically active for the recommended 150 min per week (Cutt et al 2007)

Exercise can be provided for dogs in many different ways. One of the most common forms is walking or running on a leash with the owner. Generally, owners walk dogs on a leash on the sidewalks of the city (Westgarth et al. 2010, ezáč et al. 2011). This is considered fairly safe for human and dog as it decreases the number of interactions, safe or dangerous, with strange humans or dogs and places the human firmly in control of the situations around them (ezáč et al. 2011). Decreasing the number of interactions also decreases the rate of disease transmission.

In St. Paul, we are lucky to have 4,546 acres devoted to parks within our city limits, which offer great exercise opportunities year-round for human and on-leash dog exercise. However, some dogs require more exercise than the human is willing or able to withstand. Siberian Huskies, Jack Russell Terriers and Australian Shepherds are common breeds that may be able to exercise for much longer than the average human (AKC 1996). Also, studies have shown that dogs can be more aggressive toward other dogs when leashed (ezáč et al. 2011, Westgarth et al. 2010, Cutt et al 2007).

Some owners, specifically in the suburbs or rural areas sometimes rely on backyard areas to allow their dogs to get the exercise they require. This allows the dog to have some freedom in activity choice and in duration of play, and the dog may simply re-enter the home when he or she is tired. Currently the estimated population of St. Paul, MN is around 285,000 people (Trust for Public Land 2012). National averages state that 39% of households own at least one dog (APPA 2012). Many of these people and their pets live in apartment buildings or small homes with their pets. Apartment buildings often do not have a large area where dogs can exercise off leash and homes located in the city do not have a large yard where a dog can run, fetch or play.

Still other dog owners resort to exercising their dogs off-leash in an unenclosed city or county park. While this is often against posted code of conduct for the parks, it is also extremely dangerous for the dog. In one case in California, a car driver and passenger were awarded $2.6 million in damages after being injured in an accident which occurred while trying to avoid hitting an off-leash dog in the road (Allen 2007). The owner was in a nearby park and failed to recall his dog, causing a crash. There may be other situations that have had more devastating outcomes but they have not been documented.

In response to public frustration about the lack of off-leash opportunities for city-dwelling dogs, the first off-leash dog area was established in 1979 at Ohlone Park in Berkeley, CA (Allen 2007). An off-leash dog park, as defined by Lee et al.

(2009), is a designated off-leash area, which offers an enclosed, safe area for dogs to play, socialize, and exercise with other dogs. Dog parks generally have posted rules and regulations regarding human and dog behavior in an attempt to ensure user safety (Appendix A).

Off-leash dog areas (OLDAs henceforth) were introduced as a possible solution to many shortcomings of other exercise methods (Allen 2007). Dogs are less likely to be aggressive toward each other if they are not leashed but still under voice control of a human (□ezáč et al. 2011, Westgarth et al. 2010, Cutt et al 2007). Humans can still walk with their dogs in the OLDA, contributing to human physical health, but also contributing to dog mental stimulation as the dog largely controls the actual path he or she follows (Lee et al. 2009). OLDAs are also seen as improving community because they promote responsible pet ownership, increase acquaintances among peers, and form common ground for attendees. In 2010, the Trust for Public Land found that there were a total of 569 OLDAs in the 100 largest cities in the United States. They noted that this was a 34% increase over the course of five years and that general parks only increased 3% during the same period of time.

OLDAs are promoted as largely positive but there are some potential issues that arise. Some commonly identified issues include health risks, dog problems, and people problems (Griffin and Carlson 2000, WebMD 2013). Griffin and Carlson (2000) describe the health risks inherent when interacting with other dogs, such as infectious disease transmission and parasite transmission. However, these risks can be considered low for healthy, vaccinated dogs. Dog problems include inappropriate behavior such as aggression, barking, biting, and general miscommunications (WebMD 2013). People problems are harder to define, however commonly include arguments about appropriateness of dog interactions, removal of feces, and general behavior issues.

For these reasons, studies have been attempting to discern exactly why dog owners attend, or do not attend OLDAs and what officials can do to encourage attendance. In general, it has been shown that some dog owners may have serious concerns about attending OLDAs and that this may be why these owners do not attend. In a study of public opinions about OLDAs in Texas, Lee et al. (2009) found that sanitation was a high concern for park goers at three different parks. In their survey, they asked participants to rank their satisfaction with park amenities on a scale from 1-5. Park goers for each of the three parks typically ranked shade and seating as their two largest concerns, followed closely by sanitation and lighting.

Wang et al. (2012) recently showed that the intestinal parasites *Giardia* and *Cryptosporidium* are more prevalent in OLDA-attending dogs than in dogs that do not attend OLDAs. This is currently the only study that has compared OLDA-attending dogs to dogs that do not attend OLDAs. As OLDAs become more common, it is important to understand more about why some people go, why some people don't go, and whether any preconceptions or concerns are true.

The purpose of this research was to determine patterns of OLDA use, to identify some of the concerns of dog owners, and to specifically assess cleanliness and disease transmission issues. Dog owners were surveyed to assess their attendance at and opinions of OLDAs. The cleanliness of parks was studied by

comparing OLDAs to surrounding public parks. Finally, health concerns related to dog park attendance were investigated by comparing the incidences of intestinal parasites and tick-borne diseases in dogs that frequent OLDAs and those who do not.

Section 1: Survey of General Care Patterns and Opinions

In order to determine general veterinary care patterns and ask dog owners about their opinions of OLDAs, brief surveys were distributed to patrons of Valley View Pet Hospital. Valley View Pet Hospital is 2.1 miles from Alimagnet Dog Park in Burnsville Minnesota, voted 5th in the nation by Dog Fancy Magazine in 2005 (Dog Fancy, 2005). This makes it an ideal location to study the comparison between populations that attend dog parks and those who do not.

I hypothesized that dog owners that attend OLDAs would have fewer concerns than dog owners who did not bring their dogs to OLDAs. since owners who are concerned about the quality of parks would not be likely to bring their dogs to the OLDAs.,. I also hypothesized that dog owners who attend OLDAs give their dogs more vaccines and give Heartgard more often than those who do not attend OLDAs. Vaccines are given to prevent diseases commonly contracted from contact with other dogs (kennel cough/Bordatella), ticks (Lyme disease), and small wild rodents (Leptospirosis) (Griffin and Carlson 2000). Heartgard is given to prevent against heartworms (from mosquitoes) as well as hookworms and roundworms (from contact with feces, soil or urine that is contaminated with eggs). OLDAs typically have wooded environments with other dogs that could potentially have any of these conditions.

Methods:

When owners brought in fecal samples for yearly testing from January 7th – March 1st 2013, they were asked to take a short survey about their dog park usage. The survey asked about general veterinary care such as vaccinations and Heartgard use. Other questions included opinions about dog parks requesting that participants mark agree, neutral or disagree to a given statement. For a more complete survey, see Appendix B.

Results:

Twenty-two participants filled out surveys. There were no clear differences in general care of dogs between owners who take their dogs to OLDAs and those who do not. There are no differences in types of vaccines given (Chi-Square, X^2 = 0.176); when asked about the frequency of giving Heartgard, most owners responded "Yes, year-round" or "Yes, seasonally," regardless of whether they attend OLDAs or not. Also, the primary method of exercise for both populations was either the leash or backyard (Figure 1). Note that more respondents that bring their dogs to OLDAs reported that the leash was their primary method of exercise as compared to the other exercise methods; those that do not attend OLDAs utilize a backyard more often than those who attend OLDAs, however the dog park is rarely the primary method of exercise.

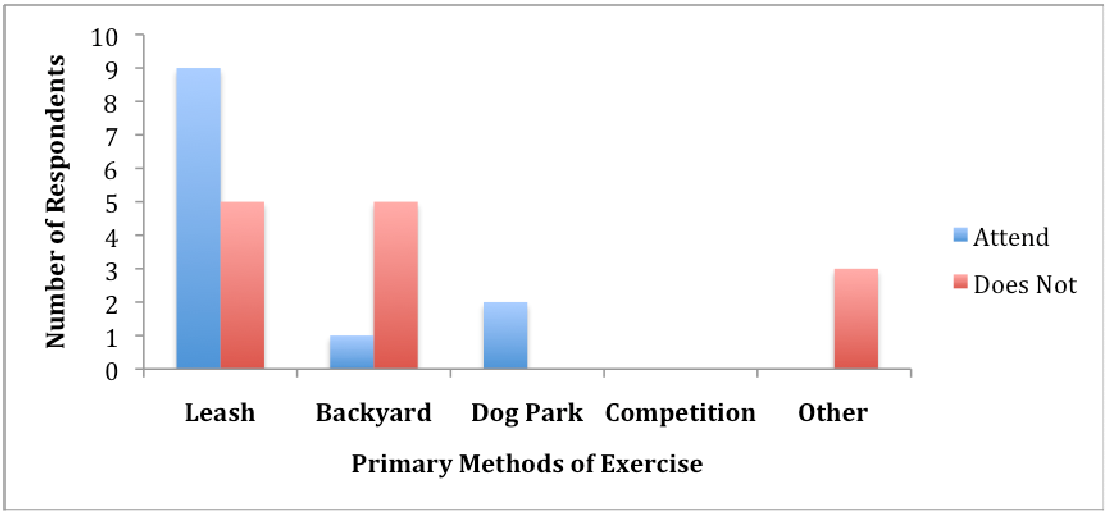

Figure 1: The primary methods of exercise for dogs that attend dog parks and those who do not, as reported by their owners in a short survey. Columns represent the number of respondents who stated that the given activity on the X-axis was their dog's primary method of activity. The owners that marked "other," stated that their dogs hunted as their primary method of activity. No statistical testing was done because some owners marked more than one selection.

When owners were asked if they believed that other dogs at OLDAs were vaccinated, no difference was found between groups (Chi-Square, $X^2 = 0.354$, NS). Both those who attend OLDAs and those who do not attend seemed evenly divided on the issue; with only slightly more people believing other dogs were vaccinated in the OLDA-attending group (64%) than in the non-OLDA group (50%).

The other opinion questions asked respondents to indicate their views about OLDAs. Again, no significant differences were found between those who attend OLDAs and those who do not attend (Table 1, Chi-Square, $p>0.05$). The overwhelming majority of owners (83%) agreed that OLDAs are good exercise for their dog. And 72% of owners agreed that OLDAs build community. Some common concerns are that OLDAs are dirty, have aggressive dogs, and spread disease, Approximately 28% of dog owners expressed concern that dog parks are dirty. Approximately 17% of dog owners expressed concern about aggressive dogs in OLDAs, however this number increases to 28% of owners when the owners who also marked concerns in the written section. Again, 28% of owners expressed concern with disease transmission via OLDAs.

Dog parks…		Agree	Neutral	Disagree	Significance?
Are Dirty.	Attends	1	7	2	$X^2 = 3.556$
	Does Not	4	3	1	NS
Have Aggressive Dogs.	Attends	2	7	1	$X^2 = 0.791$
	Does Not	1	5	2	NS
Spread Disease.	Attends	3	5	2	$X^2 = 2.094$

	Does Not	2	6	0	NS
Good Exercise For Your Dog.	Attends	10	0	0	$X^2 = 7.556$
	Does Not	5	2	1	NS
Build Community.	Attends	9	0	1	$X^2 = 4.762$
	Does Not	4	3	1	NS

Table 1: Display of responses to specific statements about OLDAs sorted by whether the respondent brings their dog to an OLDA. Numbers listed in each column represent the number of respondents who selected each category (total respondents for this section = 18). Chi-Square analysis was run for each statement with df = 3. Critical $X^2 = 7.82$, no values are significantly different between groups.

Section 2: Cleanliness Testing of Three Local Off-Leash Dog Areas

Although there are no differences between the number of non-OLDA attendees that believe dog parks are dirty as compared to those people who do not attend OLDAs (Table 1), several people identified cleanliness as a concern. Cleanliness is often a concern raised by public officials and future park users when establishing and maintaining OLDAs (Allen 2007). Also, in the optional written section of the survey, three respondents expressed concern about cleanliness of parks, especially in the spring months when the thaw occurs. These concerns led me to question if cleanliness is truly an issue in OLDAs in the Twin Cities Area. I decided to pursue whether OLDAs are in fact dirtier than other parks and whether they were associated with disease transmission, to determine if these concerns were valid. I hypothesized that the OLDAs would not be dirtier than the general park area because they have groups to enforce clean up as well as "poop stations" or mailboxes with empty plastic bags for patrons to use throughout the parks. These stations are also close to garbage cans for convenience.

Methods:

To more quantifiably ascertain if cleanliness of OLDAs was a true concern, I sampled three parks containing OLDAs in the Twin Cities area. By studying OLDAs that were contained within a general public park, OLDA cleanliness could be compared to the surrounding general park area. The three different parks in the Twin Cities area studied were: Alimagnet Off-leash Dog Park, Arlington/Arkwright Dog Park, and Thresher Fields Dog Park.

Alimagnet OLDA was selected because of its proximity to Valley View Pet Hospital, where fecal and survey studying was taking place, and because in 2005, it was ranked 5th in the nation by Dog Fancy Magazine (Dog Fancy 2005). It is located in a residential area of Burnsville, MN. PACK is the main group that cares for the park although it is publicly owned by the City of Burnsville. Sampling occurred on February 24, 2013.

Arlington/Arkwright OLDA was selected because it is located in an urban area of St. Paul, MN and was previously studied it to determine if human presence had an effect on dog behavior. ROMP is the main group that cares for the park although it is publicly owned by the City of St. Paul. Sampling occurred on February 21, 2013.

Thresher Fields OLDA was selected because it is located in a suburb but its surroundings are primarily industrial. Also, this is a very new park, having been opened in July 2012. There is no community group that cares for this park yet but it is publicly owned by the City of Eagan. Sampling occurred on February 24, 2013.

In each of the three parks, 3 samples of 10'x10' sections were selected to be analyzed from the general area and the OLDA. In the OLDA, we chose one square near the main entrance, one in the main play area and one on a walking path. Then in the general area, we looked for locations commonly populated as evidenced by footprints in the snow. The amounts of feces, urine and trash were quantified in each of the 10'x10' squares.

Results:

There were no significant differences between the general areas and OLDAs in occurrence of trash, feces or urine when all three plots in each area were combined (Figure 2, student's t-test for each, $p>0.05$). Although there is a slight increase in urine spots, the difference is non-significant and increase in urine can be explained by the presence of many dogs in a concentrated area.

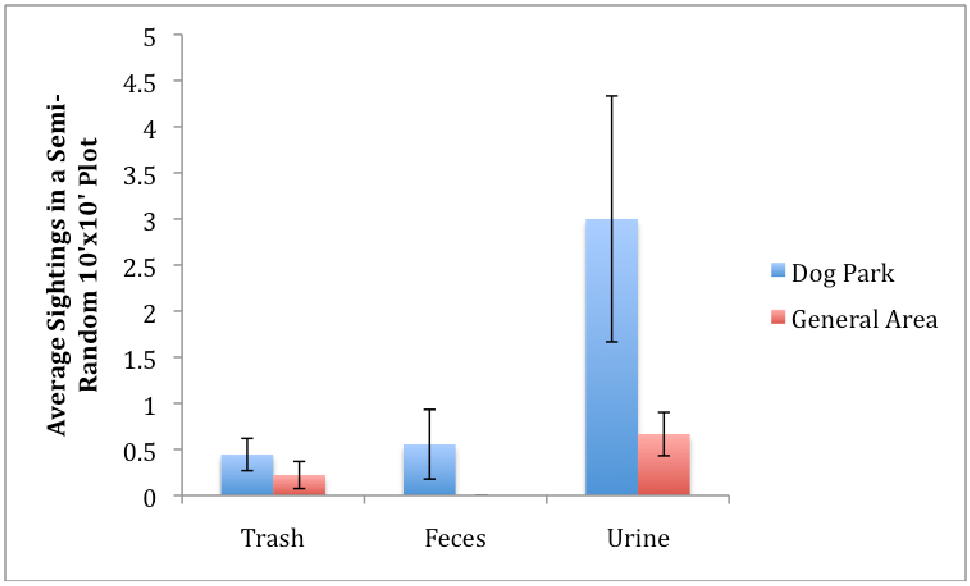

Figure 2: The average occurrence of trash, feces and urine in semi-randomly selected 10'x10' plots in OLDAs and general park areas. Columns represent the average number of sightings in a semi-random 10'x10' plot in either an OLDA or general park area. Three samples were taken for each area at three different parks ($n=9$). Error bars represent ±1 SE. No significant differences were found (student's t-test, $p>0.05$ for trash, feces and urine).

Section 3: Disease Transmission

Now that I had established that the OLDA sites were not dirtier than the surrounding general park area, I continued with my study of disease transmission. As discussed earlier, the presence of feces and contaminated soil generally increases the risks of disease transmission in OLDAs, and Wang et al. (2012) found an increase

in intestinal parasites of dogs that attended OLDAs. However, my study of local parks in the Twin Cities Area found that there were not significantly higher amounts of trash, feces or urine in OLDAs. I therefore expected that there would not be an increase in intestinal parasites because the factors that increase disease transmission (ex. feces, urine) were not different from the surrounding park area.

A. Intestinal Parasites

Methods:

To determine if the rates of disease transmission are higher in dogs that attend OLDAs, the results of fecal floatations were tracked and grouped based on whether dogs attended OLDAs or not. The fecal floatations were analyzed by combining approximately 1 tbsp of feces that was less than 24 hours old with a zinc sulfate/water solution in a tube. They were then centrifuged and allowed to sit for 10 minutes. The specific gravity of most parasite eggs is around 1.1-1.2 whereas the solution's specific gravity is closer to 1.4-1.5. When the mixture is centrifuged, the fecal matter sinks to the bottom of the tube. Then when the mixture is allowed to sit for 10 minutes, the intestinal parasite eggs float to the top because they are less dense than the surrounding water solution. The eggs float onto a microscope cover slip and can be observed under a microscope. Common intestinal parasites include hookworms, roundworms, whipworms, and coccidian, all of which can be seen under a microscope.

Results:

No significant differences in intestinal parasite incidence were observed between dogs that attended OLDAs and dogs that do not attend OLDAs (Figure 3, $X^2 = 0.386$, NS). There were two dogs that attended OLDAs that contracted intestinal parasites compared with one dog that did not attend OLDAs.

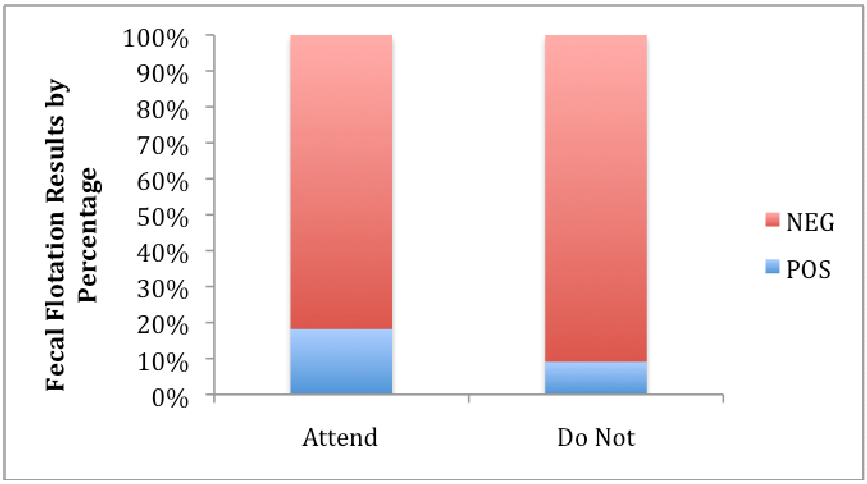

Figure 3: The effect of attendance of OLDAs on intestinal parasite prevalence in percentage. A positive result from a fecal floatation test coincides with intestinal parasites being present (n=22 total). No significant differences were found between the two groups (Chi-square, $X^2 = 0.386$, NS).

B. External Parasites (Tick-Borne Diseases)

Another annual test that is typically run is for three tick-borne diseases: Lyme disease, Anaplasmosis and Erlichiosis (Griffin and Carlson 2000). Ticks are a common external parasite in Minnesota, typically found in wooded areas and/or areas with small wild mammals. OLDAs commonly have both scenes. If the rates of internal parasites are not different between OLDA and non-attending dogs, it should follow that the rates of external parasites should also be no different between dogs that attend OLDAs and dogs that do not attend OLDAs.

Methods:

Another method of quantifying if the rates of disease transmission are higher in OLDA-attending dogs, is to test for diseases related to external parasites such as ticks. Generally when dog owners bring fecal samples to Valley View Pet Hospital for annual testing, they are also completing other annual tests such as a tick-borne disease titer. Tick-borne disease titers were also recorded and categorized according to whether dogs did or did not attend OLDAs. To determine the titer, a small sample of blood is sent to IDEXX Laboratories, an external lab, which uses their 4Dx Snap Test to test for heartworms and three tick-borne diseases.

Results:

No significant differences in tick-borne diseases were found between dogs that attended OLDAs and dogs that do not attend OLDAs (Figure 4, $X^2 = 1.208$, NS). There were two dogs that contracted tick-borne diseases and neither attended OLDAs.

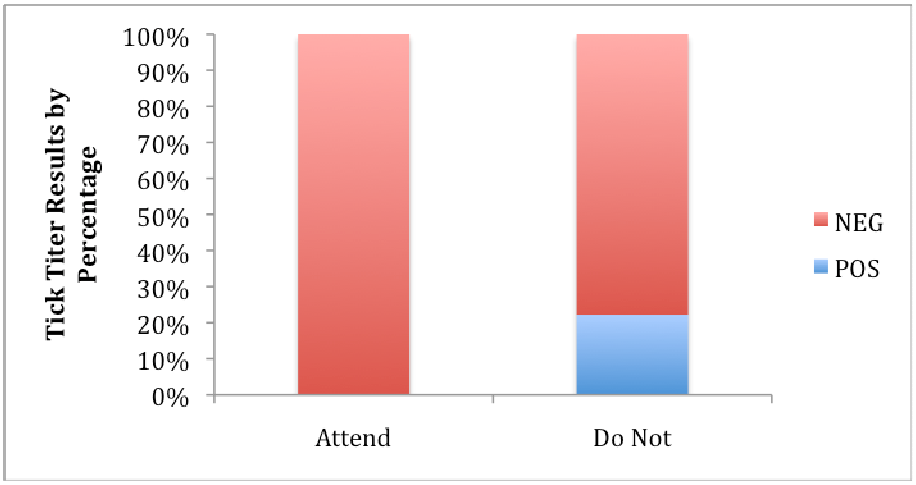

Figure 4: The effect of OLDA attendance on tick-borne disease incidence. A positive tick titer results corresponds with the dog having contracted Lyme disease, Anaplasmosis, or Erlichiosis (n=17 total). No significant differences were found between the two groups (Chi-square, $X^2 = 1.208$, NS).

Discussion:

I found similarities for all dog owners, regardless of their OLDA use, in general care patterns and opinions of OLDAs. When cleanliness of OLDAs was compared to surrounding general park areas there were no differences. Rates of internal parasites and tick-borne diseases were also similar dogs that were tested, regardless of if they attend OLDAs or not.

The similarities in general care patterns could be explained by sampling method. It is possible that those who bring their dogs to the veterinarian for yearly exams give similar care to their dogs regardless of whether they bring their dogs to OLDAs or not. Valley View Pet Hospital's policy is to recommend the same care for each dog, just emphasizing certain areas for each dog's lifestyle. Perhaps if I was to survey the park-goers directly at the OLDA, some differences may arise. However, it would then be more of a challenge to obtain a sufficient sample of owners who do not attend OLDAs. I could possibly survey different neighborhoods in the vicinity of the OLDAs for dog owners who did not utilize the park.

Owners who bring their dogs to OLDAs do not have different opinions of OLDAs from those who do not attend OLDAs. This finding was quite striking because I hypothesized that this section of the survey would divulge why some owners brought their dogs to OLDAs and why some did not. There are some patterns in the data that suggest further research is needed in this area. For example, owners who brought their dogs to OLDAs unanimously marked 'agree' to the statement "Dog parks are a good way to exercise your dog." There was some agreement in the responses by the owners who did not bring their dogs to OLDAs but they were less unanimous on the issue. These patterns of similarity could be explained by the idea that quite a few of the owners who did not bring their dogs to OLDAs marked in the written section of the survey that they had, at one point, been to OLDAs to look for themselves and make their opinions. My previous hypothesis that the opinions would be different assumed that this would not be the case; that dog owners who did not attend OLDAs were relying solely on opinions they had heard from other dog owners in the area. If both groups had seen the same park, it follows that they could have similar opinions of the parks, regardless of if they attend or not.

Previously, Lee et al. (2009) found that owners in Texas who attended OLDAs are concerned about (in order if decreasing concern) shade, seating, sanitation and lighting. Lee et al. sampled owners during the summer, when temperatures were highest and they believed this was why they had such a high concern for shade and seating at that point. Here in Minnesota during the wintertime, the same could be said about sanitation as a concern because of the impending spring thaw. In the spring months, sanitation is a large concern as much of the ground turns to mud and dog feces also melts into the mixture creating a very pungent stench (Allen 2007). If sampling were to occur in the spring months, it is possible that my results could be different. However, in the winter, it can be concluded that OLDAs are no dirtier than the surrounding public park areas.

This observation that OLDAs are no dirtier than the surrounding public park areas could come from patrons adhering to the rules (Appendix A) that come from the city that owns the park; there are also groups dedicated to caring for the park (PACK or ROMP, as discussed earlier), as well as the phenomenon that winter

weather in Minnesota can decrease attendance. Allen (2007) proposes that owners who attend OLDAs are more invested in the success of the park and are therefore more likely to care for it. Also, the OLDA and its patrons are somewhat of a community and caring for the park signifies caring for the community.

Disease transmission rates increase as sanitation decreases (Wang et al. 2013, Falco and Fish 1989, Allen 2007). Three Twin Cities OLDAs were no dirtier than the surrounding public park areas in the winter. It therefore follows that disease transmission is low in these OLDAs because sanitation is fairly high. And congruent with my findings, the incidence of intestinal parasites and tick-borne disease are not significantly different between dogs that attend OLDAs and those that do not.

My results are not consistent with some previous literature. Wang et al. (2012) found that the rate of intestinal parasites was higher in OLDA-attending dogs. However Wang et al. made their conclusion based their results from *Giardia* and *Cryptosporidium* tests in the summer in Colorado. They also tested for hookworms, roundworms, whipworms and coccidian via fecal floatation. One dog that attended OLDAs was positive for whipworms and two dogs that did not attend OLDAs were positive for either hookworms or roundworms. However, because they did not detect any *Giardia* or *Cryptosporidium* in the group of dogs that did not attend OLDAs, they were able to conclude that intestinal parasites increase when dogs attend OLDAs. Wang et al.'s results (2012) may seem to oppose this study's findings on the surface but in reality, the two studies are quite similar in their findings. Fecal floatation does not test for *Giardia* or *Cryptosporidium* very effectively and these intestinal parasites are not as common in Minnesota as they are in Colorado, where the other study took place.

Falco and Fish (1989) found that the risk of tick-borne disease is high in general public parks, which seems to oppose my findings of no tick borne diseases in OLDA dogs. However, Falco and Fish did not study the transmission rates of disease, only focusing on the occurrence of ticks found. This study was also completed in the summer, which is the peak season for finding high tick populations. Perhaps if this study were replicated during the summer, when ticks are more common, there would be different results.

One concern that seemed to be very prevalent in the survey results as well as in the documented literature was the presence of aggressive dogs at OLDAs. Although only 2 owners that attend OLDAs marked 'agree' to the statement "dog parks contain aggressive dogs," 4 owners noted concern about aggressive dogs in the written section. Hazel et al. (2010) studied interactions at OLDAs to attempt to pin down the frequency of aggressive situations. Of 901 interactions observed at 12 parks, only 44 were aggressive between dogs and only 2 were aggressive between dogs and humans. This suggests that the moments of aggression between dogs are not very frequent but because of the danger of the situation, owners are likely to remember them. However, it should be noted that Tami and Gallagher (2009) found that dog ownership or experience with dogs for greater than 8 years does not necessarily mean that the person will accurately describe the behavior as compared to those that have had less than 8 years of experience with dogs. This finding could affect not only the owners at the OLDA and their interpretation of the activities, but also the researchers in the Hazel et al. study of dog interactions.

Some research has also shown that the use of a leash causes an increase in dog aggression (Westgarth et al. 2010, ezáč et al. 2011, Cutt et al 2007). If this is true, then OLDAs should be less likely to have dog-dog aggressive situations because of the lack of leashes. The researchers observed that aggression decreases when the dog is off leash only if the owner still has voice control. Herron et al. (2009) found that non-confrontational training methods also decrease the likelihood of aggression. Using these two findings to train OLDA attenders could work to significantly decrease the amount of aggressive dog-dog and dog-human interactions in OLDAs and thus decrease the concerns of dog owners.

Winter is a time when most processes explored in this paper seem to slow down in comparison with the summer months, especially in Minnesota. It would be of great value to the scientific community to explore the patterns I established in each season to determine if any changes occur over the course of a year. Small sample size makes it difficult to ascertain whether the patterns that appear, especially in the survey of opinions, are significant or simply anomalies. Also, because the study was completed in the wintertime, I was able to track the amount of urine in my sample areas. This would not be possible in the summer months so results could be skewed if future studies were completed.

Conclusion

My study found that the opinions and some general canine care patterns of owners that attend OLDAs and those who do not were similar. Dog owners raised the same concerns about OLDAs including cleanliness, disease transmission, and aggressive dogs. In my study, OLDAs are neither cleaner nor dirtier than surrounding public park areas. Also, disease transmission rates between dogs that attend OLDAs and those who do not are not significantly different. Though aggressiveness in dogs was not studied directly, a literature search shows that aggressive altercations between dogs may be lower at OLDAs because there is no use of a leash. My works shows that OLDAs do not pose significant risks for those who utilize them so the public should be able to attend dog parks with minimal risk as long as the dogs have the necessary vaccines, parasite preventative, and registrations as required by the city that owns the OLDA. However, caution is always the best policy because other studies have found reason to be cautious (Wang et al 2012, Falco and Fish 1989), especially in the summer months. I would recommend that each owner analyze what is right for one's own dog and act on that, keeping in mind the research completed here.

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Appendix A: Park Rules

Thresher Park, Eagan, MN

Can be accessed from: http://cityofeagan.com/index.php/parks/off-leash-dog-area

1. A current, annual permit collar must be worn by all dogs while in the Off-Leash Dog Area; permits may not be transferred to other dogs. The city reserves the right to revoke or reject a permit or application at any time.
2. A City issued permit card must be carried by the handler and presented upon the request of any City official or agent.
3. Eagan residents are required to provide proof (License #) of City dog licensure.
4. Dogs must be properly vaccinated; handlers must provide proof of vaccination (vets certification or tag) with application.
5. No more than two dogs per handler are allowed in an area at one time. A handler must be at least 16 years of age.
6. Dogs that have been declared dangerous or potentially dangerous in any community or that have a known history of aggressive behavior are not allowed in the Off-Leash Dog Area. Any dog that exhibits aggressive behaviors must be removed immediately by the handler.
7. Dogs must be under visual contact and voice control of the handler at all times. A dog is considered under voice control if it will come when called. Dogs are never to be left unattended. Permission must be granted by each handler for dogs to play or interact with another dog.
8. Dogs must be leashed prior to entering and upon leaving the Off-Leash Dog Area. A dog may not be leashed within the Off-Leash Dog Area except for immediate removal. The handler must keep the leash on their person at all times.
9. The handler must clean up after their dog in all areas of the Off-Leash Dog Area including the tall grass areas and woodlands. All waste, including trash, is to be disposed of only in a designated waste container. Use a provided bag or a comparable bag for dog waste. Do not leave empty or full bags in the mesh of the fence.
10. Children under the age of 16 are not allowed in the Off-Leash Dog Area without a supervising adult.
11. Puppies under four months of age or female dogs in heat are not allowed in the Off-Leash Dog Area.
12. No food other than pocketed dog training treats is allowed in the Off-Leash Dog Area.
13. For the protection of the natural environment and the safety of other users and dogs, no smoking is allowed in the Off-Leash Dog Area. No alcohol of any type is allowed.
14. No bicycles, strollers, or wheeled or motorized vehicles, except wheel chairs or other assistive equipment used by people with disabilities are allowed. The surface may be uneven and steep.
15. The small dog area is limited to dogs no taller than 13″ at the shoulder that weigh no more than 25 pounds.

16. All City park rules and ordinances apply to Off-Leash Dog Area users. Off-Leash Dog Area hours are from 5 a.m. to 10 p.m. or as otherwise posted.
17. In the event of injury or conflict, contact Police Dispatch by dialing 911.

Arlington/Arkwright Park, St. Paul, MN
Can be accessed from: http://www.stpaul.gov/index.aspx?nid=2066

1. Keep your dog in sight and under voice control at all times.
2. Clean up and dispose of feces left by your dog. Owners must possess a device for removal of feces.
3. Dogs must be licensed and vaccinated.
4. No aggressive dogs allowed. If your dog becomes unruly or plays rough, leash it and leave immediately.
5. Female dogs in heat and dogs under the age of four months are prohibited.
6. Use at your own risk. Owners are responsible and liable for the actions and behavior of their dogs at all times.
7. Users are limited to three dogs per visit.
8. It is recommended that children be supervised by a parent or guardian.
9. Keep your dog within the designated Off-Leash Dog Area boundaries.
10. All other city park rules apply.

Alimagnet Dog Park, Burnsville, MN
Can be accessed from: http://www.alimagnetdogpark.org/

1. Pick up after your dog and fill in any holes that your dog digs. Dog waste left in the park is a nuisance that can spread disease and contaminate surface water, and holes are a hazard to all park users.
2. All dogs must enter and exit the park on a leash. No dog is to be off-leash in the parking lot or other park areas at any time.
3. People and dogs use the park at their own risk. Keep your dog in sight and under verbal control at all times.
4. Aggressive dog behavior will not be tolerated. Other park patrons may ask owners of aggressive dogs to leave and hold them liable for injuries caused by their dogs. If you are concerned about a repeatedly aggressive dog, notify the PACK Board, and, if necessary, the Burnsville police.
5. All dogs over the age of four months must be fully licensed and vaccinated. Females in heat are not allowed.
6. For their safety, supervise children inside the park at all times.
7. No human food or dog treats are allowed in the park as their presence may incite aggressive behavior.
8. Park users may use the park between 5:00 a.m. and 10:00 p.m. daily.

Appendix B: Survey

Thank you for choosing to participate in this study. This survey is meant to study public preconceptions about dog parks, specifically focusing on disease transmission and park cleanliness. Your responses and fecal flotation results will be kept confidential and used only for academic purposes. No answers or results will be tied to you. Your decision to participate will not affect your relationship with your veterinarian or the clinic. This study has been approved by the St. Catherine University Institutional Review Board. Filling out this survey is considered your consent to participate.

1) Have you ever brought your dog to an off-leash dog park?

☐ Yes ☐ No

* If you answered no, please skip to question 6.

2) If yes, which park did bring them to?

☐ Alimagnet ☐ Thresher ☐ Other _____

3) How often do you attend a dog park?

☐ +7x per week ☐ 5-7x per week ☐ 3-5x per week ☐ 1-2x per week

☐ 1-2x per month ☐ Only occasionally ☐ Other _____

4) How long do you typically stay?

☐ 60+ minutes ☐ 45-60 minutes ☐ 30-45 minutes ☐ 15-30 minutes

5) What does your dog do when there? **Check all that apply**

☐ Interact with other dogs ☐ Play fetch ☐ Play in the water

☐ Interact with humans ☐ Walk/Run with you

☐ Other _____

6) Are your dogs vaccinated? **Check all that apply**

☐ Rabies ☐ Distemper ☐ Bordatella ☐ Leptosporosis ☐ Lyme

7) Do you think other dogs at dog parks have been vaccinated?

☐ Yes ☐ No

8) Do you regularly give your dog Heartgard or other dewormer?

☐ Yes, year-round ☐ Yes, seasonally ☐ Occasionally ☐ No, never

9) What is your dog's primary method of exercise?

☐ Run/ Walk on a leash ☐ Run/ Walk in backyard ☐ Dog Park

☐ Competitive sports ☐ Other _____

10) Listed are some common statements stated by the public about dog parks. Please select the phrase that describes your feelings about each phrase.

A. Off-leash dog areas are dirty.

☐ Agree ☐ Neutral ☐ Disagree

B. Off-leash dog areas contain aggressive dogs.

☐ Agree ☐ Neutral ☐ Disagree

C. Off-leash dog areas spread disease.

☐ Agree ☐ Neutral ☐ Disagree

D. Off-leash dog areas are a good way to exercise your dog.

☐ Agree ☐ Neutral ☐ Disagree

E. Off-leash dog areas build community.

☐ Agree ☐ Neutral ☐ Disagree

11a) If you answered yes to question 1, please describe the primary reason for attending the dog park. Also, describe where your concerns have originated (ex. friends, experiences, veterinary opinions, etc).

11b) If you answered no to question 1, please describe the primary reason for not attending the dog park. Also, describe where your

concerns have originated (ex. friends, experiences, veterinary opinions, etc).

Thank you very much for your time. Your participation is greatly appreciated. Please give this to a staff member before leaving the clinic.