

Living with Coyotes; Madison Citizens' Experiences and Attitudes

Raina Eddy

The prevalence of some wildlife species in urban areas draws attention from ecologists and social scholars, alike, especially for controversial species like the coyote (*Canis latrans*). Geographers investigate urban citizens' attitudes toward wildlife as part of new forms of 'urban nature'. A gap in the research is whether actual encounters with wildlife have any impact on attitudes or behavior. This paper shares results of a public survey regarding encounters, behavior and perceptions of coyotes around Owen Conservation Park (97 acres) in Madison, WI. Coyotes frequently roam through the surrounding residential area, to the delight of some neighbors and fear of others, particularly given that on occasion pets are attacked. I sent mail surveys to 275 residents within 100 meters of the park to document if and how experiences with coyotes shape local attitudes and behavior. Survey questions tallied reported direct experiences with coyotes, behavioral change resulted from these encounters, and management preferences. The overwhelmingly positive attitudes reported in this survey stand apart those published from other urban surveys in the U.S. The majority of respondents (68%, n=156) reported they liked coyotes somewhat or very much. Additionally, 60% of respondents felt that the presence of coyotes in Owen Conservation Park made them feel more positive about this natural area. I also found some evidence that some attitudes are correlated with a respondent's type of experience. Respondents with negative experiences were more likely to approve a lethal management option. Most sociodemographic variables showed no relation with a respondent's attitudes towards coyotes; however, positive correlations were found between years of education and how much a resident likes coyotes and their preferred coyote population management, and between length of residency and the severity of management response when a coyote kills a domestic animal. Last, not all respondents followed recommended pet and yard management strategies for avoiding conflict with coyotes. Namely, walking their dog on a leash, taking pets inside after dark, and enclosing composting in their yard. Using knowledge of these attitudes to understand the context behind the conflict may help wildlife managers to reduce or prevent coyote-human conflict in the area.

Raina Eddy
Department Geography
Senior Honors Thesis
University of Wisconsin – Madison
L&S Honors Program
Science Hall, 550 North Park Street Madison, WI 53706
Advisor: Professor Lisa Naughton
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Introduction

As an adaptable, and resilient species, some coyotes now reside in urban areas across its North and Central American range. Urban areas generally allow coyotes to persist in higher number than their rural counterparts, because hunting of coyotes is prohibited and there are abundant resources in the form of food, shelter, and water year-round (Fox, 2006). With higher concentrations of both people and coyotes, the potential for interactions between them increases. Studies across the country have focused on coyotes' ecological nature, revealing how coyotes make use of the city's landscape; however, there is an emerging interest in how urban coyotes and humans interact. As urban areas are expanding across the world, novel interactions with wildlife in urban areas are becoming more likely with higher density of human populations. Interactions vary from rare to common, and from positive to negative. Reports of coyote-human interactions generally feature conflict (Baker & Timm, 2017; Lawrence & Krausman, 2011; White & Gehrt, 2009), but a systematic appraisal of attitudes in relation to experience is in need of expansion (Elliot, Vallance, & Molles, 2016; Jackman & Rutberg, 2015). The common term

used for negative interactions is human-wildlife conflict, while there is no distinct term for positive human-wildlife interaction (Dickman, 2010; Lute, Navarrete, Nelson, & Gore, 2016; Marshall, White, & Fischer, 2007). For the purpose of this article, the term human-wildlife interaction will be used as a phrase to encompass the array of interaction types occurring between humans and wildlife.

Certain wildlife species are also becoming more adaptable, allowing them to take advantage of resources in a human dominated landscape. Many of these species are small, generalist species who have high reproductive potential, such as house sparrows, house mice, and gray squirrels. In North America, most of these urban adapted species are smaller, generalist species (Soulsbury & White, 2015). An exception to this is the expansion of *Canis latrans*, or coyote, into urbanized landscapes. Their movement across the landscape comes in two parts; 1. re-establishment into cities that were part of their range pre-European colonization; 2. expansion of historic range, such as into cities on the East Coast. With this population movement, coyote numbers are surging in many urban and suburban areas in the United States, leading to more frequent and novel interactions with people especially as these animals become more comfortable living amid people (Gompper, 2002; Hody & Kays, 2018). With this in mind, it is important to consider attitudes surrounding these human-wildlife interactions.

The importance of attitudes in wildlife management is often cited (Heberlein, 2012), with Stephen Kellert leading the way in the 1980s (Stephen R Kellert, 1984). Among conservationists, changing social values has been framed as an important puzzle piece in solving a wide array of environmental causes. Values lie at the base of how people prioritize their world thus, changing values has the potential to be powerful agents of widespread environmental change. Well documented are general attitude changes unfolding with urbanization but missing is if and how direct experiences influence these attitude changes. Understanding this dynamic is powerful because attitude and behavior are sometimes used as a proxy for values. In this research there are two main trains of thought on attitudes and behavior. One line of thought believes in the power of direct experiences with wildlife to change attitudes, while others believe attitudes and values cannot be changed. An example of attitudinal change originates with Stephen Kellert's study in the 1980s where he aimed to get a better understanding of attitudes toward wildlife (Stephen R Kellert, 1984). Subsequent studies following his measures of attitudes showed a positive attitude

change towards species that have been historically stigmatized in the United States, such as coyotes and wolves (George, Slagle, Wilson, Moeller, & Bruskotter, 2016). These attitude changes are important to understand because policy makers point to human-wildlife conflict as driving public opinion and thus management. However, it has been found that in some cases, direct negative experiences do not seem to influence public opinion on a species' management (Naughton-Treves, Grossberg, & Treves, 2003).

Underlying work on attitudes is the Theory of Reasoned Action, namely the assumption that people's attitudes shape their behavior (Stephen R Kellert, 1984). This assumes that someone who holds positive attitudes towards a species will have higher concern about that species, and this higher concern will include behavioral changes that reflect their attitude (George et al., 2016). It also assumes negative experiences leads to negative attitudes, but this has been difficult to prove in practice (Treves, Naughton-Treves, & Shelley, 2013). On the other hand, Thomas Heberlein frames attitudes as stable and unchanging. The studies of attitudes is complicated because time, direct experience, and social influences all affect attitudinal change. Additionally, attitudes are not always consistent at predicting behavior (Heberlein, 2012). Previous studies have suggested that attitude-behavior consistency varies based on how they were formed (Fazio, Zanna, & Cooper, 1978). A direct experience was shown to create a stronger bond between attitude and behavior. As mentioned earlier, the Theory of Reasoned Action, assumes that people's attitudes shape their behavior (Ajzen & Fishbein, 1977). Yet, changing of attitudes may take centuries and attitudes are not always closely related to a behavioral response (Heberlein, 2012). This leads some to believe that efforts to create a shift in attitudes and values are futile. Although some argue deliberate changes in attitudes are seen as unlikely to be effective, it is key to understand existing attitudes in order to utilize them in proper management (Manfredo et al., 2017).

Research Questions:

How are socioeconomic variables associated with attitudes towards coyotes? Does gender, education level, income, or length of residence shape attitudes?

Does direct experience affect attitudes towards coyotes? Are certain encounters with coyotes, e.g. seeing them in the park, associated with more positive attitudes? Conversely, does losing a pet to coyotes, or having one's neighbor lose a pet, lead to more negative attitudes towards coyotes?

Do direct experiences with coyotes shape people's behavior? Does the type of certain experiences show any association with behavior changes, such as walking a pet on a leash or taking pets inside at night.

Literature Review

As coyotes become ever more comfortable moving amongst heavily populated cities in the United States, it is increasingly important to have well informed management on handling conflict between coyotes and humans. However, in the process of understanding these interactions, it will be important to consider both the negative interactions and the positive experiences because both play a role in forming attitudes towards coyotes. This goes to show that well informed management is complex and situation dependent. For instance, ecological studies are critical in framing the interactions between humans and coyotes, but study of the human part of the interface is required to gain context into interaction the as well. For instance, understanding how attitudes influence behavior towards coyotes and how direct experience influences conflicts between humans and wildlife is also essential to management (Baker & Timm, 1998; Soulsbury & White, 2015). More specifically, understanding the relationship between direct experience and attitudes is informative when creating effective management interventions. Studying how people think about wildlife informs management because attitudes may predict behavior. Creating clear guidelines with accurate definitions on how coyotes are handled requires an understanding of not only ecological influences on coyote behavior, but also local attitudes toward the species (Fox, 2006).

As urban areas are expanding across the world, novel interactions with wildlife in urban areas occurring. More research will be needed to understand the field as it emerges, and how these novel interactions affect humans, wildlife, and their interactions (Soulsbury & White, 2015). Just one aspect of this emerging field is attitudes and how they relate to human-wildlife interactions. This is where a gap in the research exists, particularly human-wildlife interactions in urban areas. Attitudes toward wildlife have been studied but the literature is generally either outdated, or focused on a singular species, making it temporally and geographically limited. When focusing on attitudinal research coyotes, studies indicate that attitudes toward coyotes are complex and situation dependent (Draheim, Patterson, Rockwood, Guagnano, & Parsons, 2013; Hudenko, Decker, & Siemer, 2008; Jackman & Rutberg, 2015). There is also a call for a policy focused

attitudinal research. Although important to consider attitudes, their implications on management is a practical and necessary use for attitudinal studies (Manfredo et al., 2017).

The ecological study of wildlife in urban areas is far more studied than the influence of direct experience on attitudes and behavior. For instance, the Cook County Coyote Ecology Project in the Chicago metropolitan area has been studying urban coyote ecology since 2000 (Gehrt, 2007). Although the study of urban ecology is a critical aspect of well-informed management, there is a gap in literature on the effect of direct experience on attitudes, and how length of direct experience can change attitudes over time. Leading scholars propose that direct interactions such as seeing or hearing wildlife, or suffering crop or livestock losses, are formative (Naughton-Treves, 1998). However, systematic longitudinal research has shown no impact of direct experience (Treves et al., 2013). In an era where people experience wildlife differently based on their location geographically, how direct experience generally influences attitudes will be important to understand. Specifically, how this relationship plays a role in management of wildlife. For instance, a study that aimed to assess public attitudes toward wildlife management and policy found that human safety was the most important to the respondents. This was followed by animal suffering, effectiveness, and environmental problems. It is important to have wildlife managers that take the public's opinion into consideration because a citizen's inclination to follow intervention techniques is a key component of a technique's success. Attitudes toward wild canids is an essential step when considering what management techniques are appropriate in a given locale. Additionally, the design and approach of environmental education and education campaigns benefit from knowing local attitudes (Reiter, Brunson, & Schmidt, 2012).

Finally, studies often focus on negative attitudes instead of positive. There is not a positive alternative term to use instead of human-wildlife conflict, which implies a negative interaction (Soulsbury & White, 2015). This is because the assumption is that negative experiences create negative attitudes (Heberlein, Heberlein, & Ericsson, 2005; Treves et al., 2013). This results in a focus on negative interactions with attention lacking on positive attitudes. This includes seeing a species that has historically been viewed in a negative light, and how this interaction makes people feel about green spaces, such as parks. Furthermore, longitudinal studies of attitudes are important. Using the survey design started by Kellert (1984), where he aimed to get a better understanding of attitudes toward wildlife, subsequent studies showed a positive attitude change

towards species that have been historically stigmatized in the United States, such as coyotes and wolves (George et al., 2016). Only a handful of studies on coyotes have been longitudinally sound, or aim to be in the future (Jackman & Rutberg, 2015; Weckel, Mack, Nagy, Christie, & Wincorn, 2010). Continuing to aim for longitudinal studies, and including studies of positive attitudes will only aid in the expansion and understanding of human-wildlife attitude studies.

Selection of Variables

In Kellert's (1984) study, a typology of wildlife attitudes was formulated with 10 key categories. These typologies are: naturalistic, ecologicistic, humanistic, moralistic, scientific, aesthetic, utilitarian, dominionistic, negativistic, and neutralistic. These have formed a base for following studies as an approximate description of wildlife attitudes. In this original study, gender was found to be an important indicator of what category the participant would fall into (Kellert, 1984). Many subsequent studies have discovered a higher participation rate among males, especially in hunting, trapping, and fishing. Additionally, males and females generally hold pronounced differences in attitudes. Women tended to have a higher concern for an animal's safety, which can cover topics such as animal cruelty and the dominance of animals, which includes hunting. On the other hand, males were more dominionistic, and scored high on the utilitarian scale. Males and females also showed differences in the naturalistic and ecologicistic scales. Men scored higher, indicating a greater concern for ecosystem functioning and a desire for contact with nature and wildlife (Society, 2016).

Studies on attitudes towards coyotes have been focused in two main locations in the United States. The east coast (Draheim, et al., 2013; Hudenko et al., 2008; Jackman & Rutberg, 2015), offers an interesting contrast to southern California because of the length of time coyotes have been present in the region. The first confirmed sighting of a coyote in Washington D.C. was in 2004 (Draheim et al., 2013) while coyotes have been present in California since at least the 1700s (Hody & Kays, 2018). This has resulted in two hotbeds of research with urban coyotes. However, these locations have seemingly very different interactions with coyotes.

A study in Washington D.C. asked college undergraduates about their attitudes towards coyotes and their management. They found the more fear people have towards coyotes, the less likely they were to support their presence. They also were not likely to feel pet owners were responsible for protection of pets against coyotes. This was in contrast to the majority of

respondents, pet owning and non-pet owners, feeling that coyotes are not at fault for dog and cat predation. The study also discovered two categories of students which had distinct differences in attitudes and management preferences. The first was invested in management of coyotes, lethal and non-lethal. The second group favored restricted human actions as a form of management. Within in these categories women were found to prefer techniques that changed human actions, not directly impacting coyotes (Draheim et al., 2013). They also explored the influence of pet ownership on attitudes towards coyotes because pet ownership has been correlated with more positive attitudes towards urban wildlife compared to non-pet owners (Bjerke et al., 2003). Draheim et al. (2013), found that the respondents with pets had more extreme feelings towards coyotes, either positively and negatively, and non-pet owners feared coyotes more than pet owners. However, there were not significant differences between pet-owners and non-pet owners in their levels of support of coyotes (Draheim et al., 2013).

In Westchester New York, lack of awareness and understanding of coyotes was linked with length of residency in the region. Newer residents tended to believe that “coyotes do not” belong in the community thus, should be removed and controlled (Hudenko et al., 2008). Other studies have found that a sense of community was linked to residency (McMillan W & Chavis M, 1986) and a sense of shared emotional connectedness with community members (Chavis, Hogge, McMillan, & Wandersman, 1986). However, in contrast to their own awareness, informants thought other citizens were not aware of coyote presence. In the interviews, informants often cited that the least knowledgeable and least aware members of the community were urbanites new to the area. Additionally, when asked for topics of concern regarding coyote presence in the vicinity, fear for the safety of children and pets was a priority. Although expressing concern for safety, citizens also expressed high levels of interest towards urban coyotes. This reason behind this dichotomy was not answered in this paper, but a follow up future interview session was mentioned. Furthermore, some residents with relatively ambivalent feelings towards coyotes in urban areas, conveyed more negative emotions when referring to coyotes in their own backyard. (Hudenko et al., 2008). This study highlights the importance of capturing situation specific attitudes towards coyotes in urban areas because a single individual can hold many conflicting attitudes.

In Cape Cod on the east coast of the United States, a study utilized voter responses in 2005 and 2012 to analyze attitudes towards coyote management techniques. The study by Jackman and

Rutberg (2015) showed an increase in acceptance, with a correlated opposition, to lethal control. Additionally, it showed a dissolve in gender differences from 2005 to 2012. In contrast to previous studies, women showed less fear and increased acceptance of coyotes. However, greater opposition to lethal management still showed to be true for women. Overall, most negative attitudes were associated with fear for safety. This includes for both pets and children. It is also important to note that although respondents were more accepting of coyotes in 2012, attitudes generally stayed in the neutral range which shows the complexity of changing attitudes (Jackman & Rutberg, 2015).

On the other side of the country, surveys were administered to residents in Cook County County, Illionis and Los Angeles County, California. Elliot et al. (2016) aimed to gather a wide range of information, including socio-demographic information, and fears, attitudes, knowledge, of coyotes. Attitudes towards coyotes were not significantly different between the two counties although being thousands of miles apart. Most residents enjoyed seeing wildlife in their neighborhood and supported maintaining native plants and animals in urban areas. Yet, the level of agreement dropped when asked if the respondent would like to see a coyote in their neighborhood. At the same time, a majority of the respondents thought residents should learn to live with coyotes, and coyotes are important to the nature of their county. Another component of interest in this study was the influence of direct experience. The more frequently a respondent saw a coyote, the less afraid the respondent tended to be of coyotes. They hypothesized this was due to a lack of negative interactions and coyotes in reality being smaller than expected (Elliot, Vallance, & Molles, 2016). Another way to test attitudes is based on normative beliefs on lethal and non-lethal management towards coyotes in urban green spaces. This study uses Fulton's (1996) wildlife value orientations, which is informed by the cognitive hierarchy structure of values, beliefs, attitudes, norms, behavioral intentions, and behaviors. When comparing beliefs on lethal and non-lethal management to value orientations, attitudes, and behavioral intentions, distinct groups emerged. Groups differed based on sex and their participation in hunting and fishing. Segmenting the public into groups based on normative beliefs proved useful in this study. However, this study was limited a suburb of Denver, Colorado (Vaske & Needham, 2007). These four studies (Draheim et al., 2013; Elliot et al., 2016; Hudenko et al., 2008; Jackman & Rutberg, 2015; Vaske & Needham, 2007) highlight just a few of the many approaches to studying attitudes, specifically wildlife attitudes. On the other side of the country

in Washington D.C., Draheim et al. (2013) found two distinct groups in their sample differing in attitudes and management preferences. The first was invested in management of coyotes, lethal and non-lethal. The second group favored restricted human actions as a form of management (Draheim et al., 2013). This was addressed in the survey design by asking about preferred management options if a coyote is seen in a residential area, if a coyote is seen in your yard, if a coyote injures a pet or domestic animal, and if a coyote kills a pet or domestic animal. Additionally, the survey question also addressed the influence of pet ownership by asking if they are pet owners, and if they have any injuries or deaths with a domestic pet or animal. Bjerke et al. (2003) found that pet ownership was correlated with more positive attitudes toward urban wildlife compared to non-pet-owners (Bjerke, Østdahl, & Kleiven, 2003).

Background

Study Site

Owen Conservation Park located on the westside of Madison, Wisconsin provides an ideal location of an attitudinal study of coyotes. Previously, the park was once a farm in the possession of Professor Edward Owen. It has since returned to its more prior state of a prairie and oak savanna with its designation as a park in 1972. This park of 97-acres is now used for recreation, with hiking trails that can be used in all seasons. The park's trails open for use year-round are heavily frequented by the public ("Owen Conservation Park - Madison Parks - City of Madison, Wisconsin," n.d.). Owen Conservation Park is also home to a known coyote pack, which frequents between Owen and a nearby research park (Mueller, Drake, & Allen, 2018). Coyotes rely on green areas heavily and on small, disjunct resource patches in the urbanized landscape (Atwood et al., 2004); Owen Conservation Park functions as this green space in Madison's westside urban landscape. Although the park is surrounded by a residential area, the landscape still allows for ease of access in and around the park for coyotes. When hiking through the park you can turn your head and see houses through the trees. Local residents share property lines with the park, with these boundaries having little significance to a coyote. This creates a perfect study area in which to study attitudes towards coyotes. With a known coyote pack living in a residential area, the potential for direct experiences with coyotes is likely.

Methods

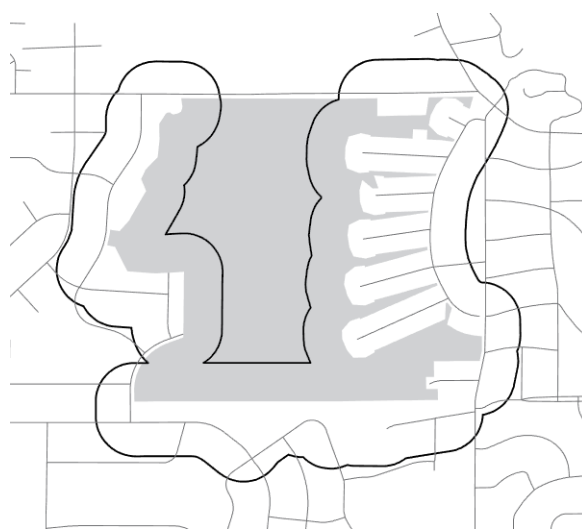
Survey Design

Survey design was tailored to examine not only a respondent's experience with coyotes, but also other factors that have been found to play a role in predicting attitudes such as gender, age, income, and education (S R Kellert, 1985; Treves et al., 2013). The first question asked in the survey was aiming to obtain information on if a survey recipient has had a direct experience with a coyote in Madison, in Owen Conservation Park, and in their yards. For each location, the frequency of the encounters was also asked. A respondent could fill in either weekly, monthly, yearly, or less than once a year. These questions were asked because of the importance a direct experience plays in forming attitudes (Fazio et al., 1978; Stephen R Kellert, 1984).

Behavior was tested asking the frequency in which they practice certain habits. These include pet management, if they walk their dog on a leash, take pets inside after dark, and if they feed pets outside. Yard management questions included if they enclose composting, fencing their yard, and limiting animals' access to spaces under their home. Additionally, they were asked if any habits they practice were in response to seeing or hearing a coyote. This is a way at testing behavior-attitude consistency.

Data Collection and Analysis

Data on mail recipients was acquired via the online database of GeoData@Wisconsin tax parcel data from 2017. Using ArcMap, the parcel data was narrowed down to houses within one-hundred meters of the park. All parcels chosen for surveying are within one-hundred meters of the Owen Conservation Park and Crestwood Park (Graphic 1). The first 192 recipients, Group A, have property lines that directly touch the park boundary. Group B are also within 100 meters of the boundary of the park but have at least one property and one road between their property and the park area. This resulted in a pool of



Graphic 1

possible participants in which then 83 were then randomly selected from to reach a total of 275 survey recipients.

Surveys were sent out via mail in January of 2019. A secondary round of surveys were given out door to door to people who had not responded to the survey by February 9th, 2019. The non-respondents were randomly selected from the pool of survey recipients who had not responded by February 9th. If a person answered the door, four questions deemed the most important (Appendix 2) were asked in attempt to see the differences between respondents and non-respondents. If no one answered, a secondary survey was left to increase the response rate. During the second round of survey distribution, twenty-five surveys were left at doors and four non-respondent interviews were completed on February 9th. Survey entry stopped on March 8th, 2019. When data entry stopped on March 31st, the response rate was 62%. This accounted for the 11 undeliverable surveys, bringing the sample size down from 275 to 264. 71% of respondents were from Group A (response rate 61%), and 29% were from Group B (response rate = 57%).

Univariate tests (χ^2 and Mann-Whitney U tests) to identify the role of predictors, such as gender, and negative experiences with coyotes such as a pet loss, in indicating a person's attitude towards coyotes. Spearman rank tests were run to determine the role predictors such as age, or where a respondent grew up, had on a respondent's attitude.

Results

Descriptive

Of the respondents, 54% were female, 44% male, and 2% responded with "prefer not to answer" or "other" (n = 158, Appendix I). Respondents ranged from 30 years old, to 90 years old, with a mean of 60 years of age (n = 155). This was calculated by subtracting 2019 minus the year in which they were born. Most of respondents in Owen Conservation Park grew up in a city (42%), followed by small town (30%), a rural area (17%), with only 11% having grown up in small cities (n = 156, Appendix I). The residential area surrounding Owen Conservation Park consists mainly of college education respondents (n = 158. 55% of respondent's highest level of education is graduate school, followed by bachelor's degree (34%), some college (9%), and high school (2%). Table 1 outlines the income distribution of respondents.

Table 1: Income (n = 135)

Under \$10,000	0%
\$10,000 - \$30,000	4%
\$30,000 - \$50,000	7%
\$50,000 - \$75,000	12%
\$75,000 - \$90,000	8%
\$90,000 - \$120,000	21%
\$120,000 - \$150,000	21%
\$150,000 - \$300,000	19%
Over \$300,000	9%

12% of respondents reported their parents depended on raising livestock for a major share of their income (n = 162). 11% of the respondents have hunted in the past two years (n=161, Appendix I), while 17% of people have hunted regularly at any time in their life (n=159, Appendix I). Additionally, no one reported hunting coyotes at any point in their life. 54% of households identified as pet owners. People who owned dogs, cats, or chickens were classified as pet owners because dogs, cats, and chickens are pets that are more commonly outside pets and the most frequently cited pets (Table 2).

Table 2: Pet Ownership (n = 164)

	Yes	No
Dog Owner	41%	59%
Cat Owner	22%	78%
Chicken Owner	5%	95%

Respondents have lived at their current address ranging from less than a year to 61 years with a mean of 19.8 years and a median of 18 years (n = 158). When asked, “How much did the proximity of Owen Conservation Park influence your decision to rent or buy your current home?” (n=162), most people responded with “One of several criteria” (51%), followed by “It had very little importance in my decision.” (33%), “One of the most important reasons. I wanted to live as close to Owen as possible.” (16%), and no one preferred to live farther from Owen Park (n = 162,). However, it is important to consider the park was acquired in 1972. Some respondents moved into the area before it became a park and was still a working farm. Additionally, when asked how often they visit Owen Park, most respondents reported weekly visits (40%), followed by monthly (21%), about 3 to 6 times a year (14%), daily (13%), once a year or less (11%), and never (1%) (n = 162, Appendix I).

Most people have either seen or heard a coyote in the Madison area with only 3 respondents having no experiences with coyotes (Table 3). Additionally, most respondents seem to see coyotes yearly or monthly in Madison and Owen Conservation Park, while the frequency declines when reporting seeing or hearing coyotes in their yard.

*Table 3: Which of the following experience(s) have you had with **wild coyotes**?*

	Weekly	Monthly	Yearly	Less than Once a Year	No Frequency
Seen or heard a coyote in the Madison area. n = 152	8%	32%	37%	16%	7%
Seen or heard a coyote in Owen Conservation Park. n = 141	9%	36%	38%	12%	5%
Seen or heard coyotes in your yard. n = 78	0%	10%	36%	50%	4%
No experiences. n = 3					

Respondents were put into two groups, the first consisting of people with “negative” experiences. These were people who reported that they “had one of your pets or domestic animals killed or injured by a coyote” or they “had a neighbor(s) report that their pet or domestic animal was injured or killed by coyotes”. People who reported neither of these, were classified as people with no negative experiences (Table 4).

Table 4: Experience Type

Negative Experiences	Had a neighbor(s) report that their pet or domestic animal was injured or killed by coyotes n = 34	Had one of your pets or domestic animals killed or injured by a coyote n = 7
No Negative Experiences	Did not have: a neighbor(s) report that their pet or domestic animal was injured or killed by coyotes or one of your pets or domestic animals killed or injured by a coyote n = 123	

Attitude Proxy Questions

As a way to understand attitudes, three key questions were used as a proxy for a respondent's attitudes towards coyotes. The first of these is how much a respondent likes or dislikes coyotes (n = 156, Appendix I). Overall, the group is very positive towards coyotes, with 68% of respondents responding with "like very much" (38%) or "like somewhat" (30%), followed by "neutral" (25%), "dislike somewhat" (4%), and "dislike very much" (3%). Additionally, 60% of respondents said that the presence of coyotes in Owen Conservation Park made them feel more positive about the park while only 5% felt less positive about the park because of the presence of coyotes in the park (n = 161, Appendix I). Respondents generally agreed (86%) that coyotes help maintain the balance of nature (n = 160), while 55% of respondents agreed with the statement "I may never actually see or hear a coyote, but it is important to me to know they live in Madison." (n = 155), and 61% of respondents agree that coyotes are aesthetically pleasing (n = 160, Appendix I). These questions were drawn from Stephen Kellert's pioneering attitude research from the 1970s and that of scholars, such as Jeremy Bruskotter.

A respondent's preferred management option is another way to access how they feel towards coyotes because it is a way in which they express their attitude. The second proxy question used is how a respondent feels coyote populations in their neighborhood should be managed (n = 154). There was an overwhelming majority that felt coyote populations should be maintained (60%) or allowed to grow (31%) in their neighborhood, while only 9% felt the population should be reduced (6%) or eliminated (3%).

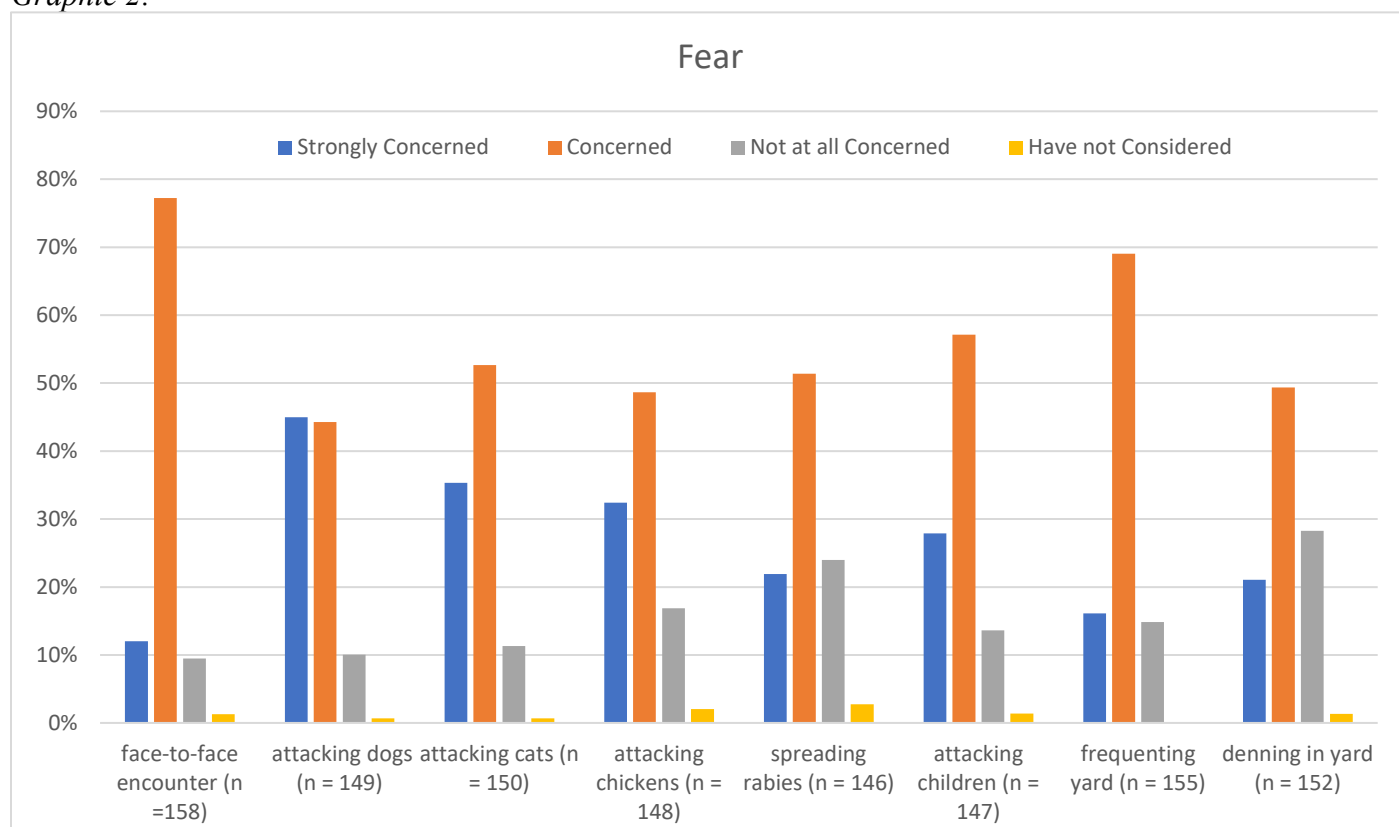
Our third proxy variable to test attitudes is what management scenario a respondent prefers if a coyote kills a pet. Of the four scenarios presented where the respondent chose their desired management response, scenario four is the most negative experience, with a coyote killing another domestic animal, such as a pet (Appendix I). This was chosen for preliminary analysis because studies have shown that women are more likely than men to support non-lethal management techniques (Jackman & Rutberg, 2015; Martínez-Espiñeira, 2006). Across all management scenarios proposed (Appendix I), the percent of respondents choosing the response "Authorities should kill the coyote" increases. However, even if a coyote kills another domestic animal, such as a pet, 52% of respondents feel that no action is needed, or authorities should monitor the situation (Table 5).

Table 5: If a coyote kills another domestic animal, such as a pet (n = 161):

<ul style="list-style-type: none"> • No action is needed. • Authorities should monitor the situation. 	52%
<ul style="list-style-type: none"> • Authorities should haze the coyote to make it less comfortable around people. • Local citizens should haze the coyote to make it less comfortable around people. 	14%
Authorities should capture and relocate the coyote to a rural or wild area.	24%
Authorities should kill the coyote.	11%

Respondents seem unafraid of coyotes living in their neighborhood. When asked to mark their level of agreement with the statement, “It makes me feel afraid that coyotes live in my neighborhood, the majority of people responded with strongly disagree (56%), followed by disagree (32%), neutral (9%), agree (4%), and strongly disagree (0%). Yet, when presented with scenarios with coyotes and asked how concerned they were, the level of concern is quite high (Graphic 2, Appendix I). This may seem contradictory but may be in the way they interpreted the question.

Graphic 2:



Sociodemographic Variable Analysis

Using a chi-square test, males and females (n=155) show no significant difference in their responses to how much they like or dislike a coyote, their preferred management of coyote populations in their neighborhood, or their preferred management if a coyote kills another domestic animal, such as a pet. My calculations were based on respondents who answered “male” (44%) and “female” (52%) responses. I had to remove respondents who answered “other” (1%) or “prefer not to answer” (1%) from analysis due to low response rates (Appendix I). Using spearman-rank analysis, I found no significant difference in age versus respondents’ answers to how much they like or dislike a coyote, their preferred management of coyote populations in their neighborhood, or their preferred management if a coyote kills another domestic animal, such as a pet.

Like gender and age, the community in which a respondent grew up was not significantly associated with a respondent’s answer to how much they like or dislike a coyote, their preferred management of coyote populations in their neighborhood, or their preferred management if a coyote kills another domestic animal, such as a pet (Appendix I). This analysis was done using a spearman rank correlation. Income, livestock ownership, or hunting background was similarly insignificant as a predictor. Furthermore, in this population, pet ownership was not found to predict a respondent’s attitude towards coyotes. Using a chi-square analysis, pet owners (54%) and non-pet owners (46%) do not differ in their responses to how much they like or dislike a coyote, their preferred management of coyote populations in their neighborhood, or their preferred management if a coyote kills another domestic animal, such as a pet.

Using a spearman rank test of correlation, a significant positive correlation was found between education and how much a respondent likes or dislikes coyotes (p-value = 0.03, rho = .18). However, was not found to be a predictor of their preferred management of coyote populations in their neighborhood, or their preferred management if a coyote kills another domestic animal, such as a pet.

Using a spearman rank test of correlation, a significant positive correlation was found between length of residency and a respondent’s preferred management if a coyote kills another domestic animal, such as a pet (p-value = 0.02, rho = .19). It was also found to be weakly correlated with a respondent’s preferred management of coyote populations in their neighborhood (p-value = 0.09,

$\rho = -.14$), yet was not found to be a predictor of how much a respondent likes or dislikes coyotes (Appendix I).

Direct Experience Analysis

71% of respondents were from Group A (response rate 61%), and 29% were from Group B (response rate = 57%). Proximity to the park did not yield any significant results. People directly next to the park (Group A) and people living within 100 meters, but slightly farther away (Group B) experienced coyotes with insignificant differences (p -value = 0.38). Additionally, the location where a respondent had an experience with a coyote does not seem to affect how much they like or dislike coyotes. There was no significant correlation found between the frequency and location of the direct experience, and how much the respondent liked coyotes.

High level of direct experiences limited our ability to draw conclusions between people who have had an experience with a coyote, and the ones that have not because only 3 respondents reported having no experiences with coyotes (Table 3). However, the type of experience could be explored. Respondents were put into two groups, the first consisting of people with “negative” experiences. These were people who reported that they “had one of your pets or domestic animals killed or injured by a coyote” or they “had a neighbor(s) report that their pet or domestic animal was injured or killed by coyotes”. People who reported neither of these, were classified as people with no negative experiences (Table 4). A correlation was found between negative experiences and quickness on the trigger. Using a chi-squared tests, respondents who have had a negative experience with a coyote, are more likely to want to kill the coyote across all management scenarios (p -value = 0.004). A correlation was also found between a negative experience with a coyote and a respondent’s preferred management of coyote populations in their neighborhood (p -value = 0.005). Finally, there was also a weak correlation between the type of experience a respondent had, negative or not negative, and how much a respondent like or dislikes coyotes (p -value = 0.10).

Behavior

Behavior was interrogated by asking the frequency in which respondents practice certain habits and how frequently. These include pet management; if they walk their dog on a leash, take pets inside after dark, and if they feed pets outside. Yard management questions included if they enclose their composting, fence their yard, and limit animals’ access to spaces under their home.

They were also given an option to fill in the blank for other yard management techniques (Table 6, Appendix I). Many respondents used this opportunity to cite having bird feeders outside.

The next question asked the respondent if any of the above habits were changed because of an experience with a coyote (Appendix I). Behavior changes were analyzed on a yes/no basis, but the respondent also had an opportunity to write which specific behaviors were changed. At first glance, the vast majority people did not alter their management of yards or care of their pets in response to coyotes' presence. Only 12% of respondents reported a change in yard management or pet care in response to coyote presence. . The influence on negative experiences on behavior changes with coyotes were analyzed with a chi-squared analysis. The type of experience (Table 6) did seem to have a weak correlation to changes in yard and pet management (p-value= 0.12).

Table 6: Habits

	Always	Sometimes	Seldom	Never	No Frequency	Habit Changed?
Walk Dog on Leash n = 92	48	17	6	19	2	Yes = 5
Take pet(s) inside after dark n = 90	64	9	0	15	2	Yes = 11
Feed pet(s) outside n = 63	2	1	2	58	0	Yes = 1
Enclose composting in your yard n = 89	57	5	2	24	1	Yes = 2
Limit animals' access to spaces under your home n = 86	59	8	2	13	4	Yes = 1
Fence all or part of yard n = 98	64	2	4	23	5	Yes = 6
Put food out to attract coyotes n = 60	1	0	0	59	0	Yes = 0

Conclusion

This sample of residents surrounding Owen Conservation Park is unusually positive towards coyotes. This is unique because other attitudinal wildlife research often finds when wildlife, especially controversial species such as predators, are in close contact with people, fear and resentment surface (Treves et al., 2013). Additionally, my finding of the influence of a negative

direct experience on a respondent's attitude is somewhat novel in attitudinal wildlife research. Respondents reporting a negative experience such as a death or injury of a pet or domestic animal, or a neighbor reporting a death or injury of a pet or domestic animal, may have different opinions on management and may have changed their behavior in response to these experiences. People who have had a negative experience, are more likely to want to kill the coyote across all management scenarios. Education was found to predict how much as respondent likes coyotes and length of residency was correlated with preferred coyote management in their neighborhood. Having empirical proof that the type of experience is correlated to attitudes is useful in informing further wildlife research and management of coyotes. However, it is important to note that the positive attitudes found in this study are not necessarily applicable to other coyote populations in cities across the country.

Discussion

It is important to consider that these results have a few possible problems. First of all, a test of non-response bias needs to be conducted. Even with a response rate of 62%, it is important to consider how the other 38% of survey recipients feel about coyotes. Furthermore, the results need to be taken with a consideration for people who may have held back from reporting a pet loss or injury from a coyote in an attempt avoid tarnishing the coyote's reputation in their neighborhood. In fact, one respondent told us in person that they did not record a possible cat loss because of this after the survey. This could have implications on the effect of negative experiences on management preferences or behavior.

Additionally, although the majority of sociodemographic variables tested here are insignificant in terms of the p-value, the findings are significant in terms of attitudinal wildlife research. The literature points to socio-economic variables, such as gender and age, as being indicators of a person's attitude towards wildlife (Stephen R Kellert, 1984; Society, 2016). In my study, only length of residency and education were found to predict attitudes while income, age, gender, community in which they grew up, and hunting did not act as attitude predictors. It is also unique that the presence of coyotes in the park makes the majority of residents feel more positive about Owen Conservation Park. Typically, when people live up close and personal with potentially problematic wildlife, especially with large predators, attitudes are not positive towards the species (Treves et al., 2013).

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Appendix I

Question 1:

Which of the following experience(s) have you had with **wild coyotes**? (✓CHECK ALL THAT APPLY)

- Seen or heard a coyote in the Madison area.
If yes, how often: Weekly Monthly Yearly Less than once a year
- Seen or heard coyotes in Owen Conservation Park.
If yes, how often: Weekly Monthly Yearly Less than once a year
- Seen or heard coyotes in your yard.
If yes, how often: Weekly Monthly Yearly Less than once a year
- Had a neighbor(s) report that their pet or domestic animal was injured or killed by coyotes
- Had one of your pets or domestic animals killed or injured by a coyote
(if yes, # of incidents ____)
- Other experience(s): _____
- No experiences with coyotes

Question 2:

Which of the following practices do you follow? (✓CHECK ALL THAT APPLY, then CIRCLE HOW OFTEN)

	<i>Always</i>	<i>Sometimes</i>	<i>Seldom</i>	<i>Never</i>
<input type="radio"/> Walk dog on leash	A	S	s	N
<input type="radio"/> Take pet(s) inside after dark	A	S	s	N
<input type="radio"/> Feed pet(s) outside	A	S	s	N
<input type="radio"/> Enclose composting in your yard	A	S	s	N
<input type="radio"/> Limit animals' access to spaces under your home	A	S	s	N
<input type="radio"/> Fence all or part of yard	A	S	s	N
<input type="radio"/> Put out food to attract coyotes	A	S	s	N
<input type="radio"/> Other practices? (_____)	A	S	s	N

Question 3:

If you practice any of the techniques above, were they in response to seeing or hearing a coyote?

- Yes (if yes, which ones? _____)
- No

Question 4:

How much do you like or dislike coyotes? (CHOOSE ONE):

- Like very much
- Like somewhat
- Neutral
- Dislike somewhat
- Dislike very much

Question 5:

In your opinion, should coyote populations in your neighborhood be _____ (CHOOSE ONE):

- Allowed to grow

- Maintained at current level
- Reduced
- Eliminated

Question 6:

How aware do you think others in your community are about the presence of coyotes in your neighborhood?

- My neighbors are more aware of coyotes than I am
- My neighbors are about as aware of coyotes as I am
- My neighbors are less aware of coyotes than I am

Question 7:

Which answer best matches your opinion? (CHOOSE ONE):

- The presence of coyotes makes me feel more positive about Owen Conservation Park.
- The presence of coyotes does not affect how I feel about Owen Conservation Park.
- The presence of coyotes makes me feel less positive about Owen Conservation Park.

Question 8:

Please circle the response that best describes your level of agreement with each of the following statements about coyotes.

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
It makes me afraid that coyotes live in my neighborhood.	A	a	N	d	D
Coyotes belong in more wild places, not the suburbs.	A	a	N	d	D
I may never actually see or hear a coyote, but it is important to me to know they live in Madison.	A	a	N	d	D
I think coyotes help maintain the balance of nature.	A	a	N	d	D
I think coyotes are aesthetically pleasing.	A	a	N	d	D

Question 9:

Please circle the response that best describes your level of concern with the following situations with coyotes.

	<i>Strongly Concerned</i>	<i>Concerned</i>	<i>Not at all concerned</i>	<i>Have not thought about this</i>
Potential risk to myself in a face-to-face encounter with a coyote.	A	a	N	d
Coyote(s) attacking dogs.	A	a	N	d
Coyote(s) attacking cats.	A	a	N	d
Coyote(s) attacking chickens.	A	a	N	d
Coyote(s) spreading rabies.	A	a	N	d
Coyote(s) attacking children.	A	a	N	d
Coyote(s) frequenting your yard.	A	a	N	d

Coyotes denning in your yard | A a N d

Question 10:

If a coyote is seen in a *residential area*: (✓CHECK ONE)

- No action is needed.
- Authorities should monitor the situation.
- Authorities should haze the coyote to make it less comfortable around people.
- Local citizens should haze the coyote to make it less comfortable around people.
- Authorities should capture and relocate the coyote to a rural or wild area.
- Authorities should kill the coyote

Question 11:

If a coyote is seen in *your yard*: (✓CHECK ONE)

- No action is needed.
- Authorities should monitor the situation.
- Authorities should haze the coyote to make it less comfortable around people.
- You should haze the coyote to make it less comfortable around people.
- Authorities should capture and relocate the coyote to a rural or wild area.
- Authorities should kill the coyote.

Question 12:

If a coyote injures another domestic animal, such as a pet: (✓CHECK ONE.)

- No action is needed.
- Authorities should monitor the situation.
- Authorities should haze the coyote to make it less comfortable around people.
- Local citizens should haze the coyote to make it less comfortable around people.
- Authorities should capture and relocate the coyote to a rural or wild area.
- Authorities should kill the coyote.

Question 13:

If a coyote kills another domestic animal, such as a pet: (✓CHECK ONE.)

- No action is needed.
- Authorities should monitor the situation.
- Authorities should haze the coyote to make it less comfortable around people.
- Local citizens should haze the coyote to make it less comfortable around people.
- Authorities should capture and relocate the coyote to a rural or wild area.
- Authorities should kill the coyote.

Question 14:

In what year were you born? _____

Question 15:

Gender: Male Female Other Prefer not to answer

Question 16:

What is the highest level of school you have completed? (✓CHECK THE HIGHEST LEVEL)

- Grade school
- High school
- Some college
- Bachelor's degree or equivalent
- Graduate or professional degree

Question 17:

Please check the space that comes closest to your total family income before taxes.

- | | | |
|---|--|---|
| <input type="radio"/> Under \$10,000 | <input type="radio"/> \$50,000-\$75,000 | <input type="radio"/> \$120,000-\$150,000 |
| <input type="radio"/> \$10,000-\$30,000 | <input type="radio"/> \$75,000-\$90,000 | <input type="radio"/> \$150,000-\$300,000 |
| <input type="radio"/> \$30,000-\$50,000 | <input type="radio"/> \$90,000-\$120,000 | <input type="radio"/> Over \$300,000 |

Question 18:

If you have pets or domestic animals, what type and how many of each?

- Dogs (Number: _____)
- Cats (Number: _____)
- Chickens (Number: _____)
- Other(s) and number: _____

Question 19:

Do any of your animals spend most nights outdoors?

- Yes
- No
- I don't have animals

Question 20:

Which of the following best describes the community where you spent most of your childhood?

- Rural area (population < 2,500)
- Small town (population < 50,000)
- Small city (population < 150,000)
- City (population > 150,000)

Question 21:

Have you hunted in the past two years? Yes No

Question 22:

Have you regularly hunted at any other time in your life? Yes No

Question 23:

If you have ever hunted, what do/did you hunt? (✓CHECK ALL THAT APPLY.)

- | | | |
|---|----------------------------------|--|
| <input type="radio"/> Bears | <input type="radio"/> Game birds | <input type="radio"/> Fur-bearing animals |
| <input type="radio"/> Deer | <input type="radio"/> Coyotes | <input type="radio"/> Other animal(s)_____ |
| <input type="radio"/> I am not a hunter | | |

Question 24:

Did your parents ever depend on raising livestock for a major share of their income?

- Yes
- No

Question 25:

How many years have you lived at your present address? _____

Question 26:

How would you classify your residence? (✓CHECK THE BEST RESPONSE):

- Renting
- Owning

Question 27:

How much did the proximity of Owen Conservation Park influence your decision to rent or buy your current home?

- One of the most important reasons. I wanted to live as close to Owen as possible.
- One of several criteria
- It had very little importance in my decision
- I would have preferred to live farther from Owen Park

Question 28:

On average, how often do you visit Owen Park?

- Daily
- Weekly
- Monthly
- About 3-6 times a year
- Once per year or less
- Never entered Owen Park

Question 29:

Other Wisconsin Landholding(s):

What county?

How many acres?

How many years of ownership? _____

Purpose (✓CHECK ALL THAT APPLY):

- Residence
- Livestock Production
- Crops
- Hunting
- Timber
- Nature conservation
- Recreation / retirement
- Other purpose(s): _____