Humans and Coyotes in Suburbia: Can Experience Lead to Sustainable Coexistence?

December 2008

HDRU Series No. 08- 9

Prepared by

Heather Wieczorek Hudenko,
William F. Siemer, and Daniel J. Decker
Human Dimensions Research Unit
Department of Natural Resources
Cornell University
Ithaca, NY 14853

HUMAN DIMENSIONS RESEARCH UNIT PUBLICATION SERIES

This publication is part of a series of reports resulting from investigations dealing with public issues in the management of wildlife, fish, and other natural resources. The Human Dimensions Research Unit (HDRU) in the Department of Natural Resources at Cornell University is a nationally recognized leader in the study of the economic and social values of wildlife, fish, and other natural resources and the application of such information in management planning and policy. A list of HDRU publications may be obtained by writing to the Human Dimensions Research Unit, Department of Natural Resources, Fernow Hall, Cornell University, Ithaca, New York 14853, or by accessing our World Wide Web site at: http://www.dnr.cornell.edu/hdru/.

Humans and Coyotes in Suburbia: Can Experience Lead to Sustainable Coexistence?

Heather Wieczorek Hudenko, William F. Siemer, and Daniel J. Decker

Human Dimensions Research Unit
Department of Natural Resources
Cornell University
Ithaca, New York, 14853-3001

HDRU Series Publication 08-9

December 2008

Key Words: attitudes, *Canis latrans*, carnivores, concerns, coyote, experience, human-wildlife interactions, risk perception, suburban stakeholders

EXECUTIVE SUMMARY

Expansion of coyote populations in New York State (NY), coupled with significant suburban development, have led to an increase in encounters between humans and coyotes. Little is known about how increased experiences with coyotes may affect people's attitudes and risk perceptions of coyotes. Understanding this relationship may have important implications for coyote conservation and management in NY. Trends identified in early analyses of telephone survey data from the New York Suburban Coyote Study, and contradictory findings in the literature on other carnivore species, led us specifically to examine the possible relation between experience with coyotes, attitudes about coyotes, and risk perceptions. We drew from previous studies to develop four hypotheses about experience with coyotes. We used data from two telephone surveys, conducted as part of a situation analysis in Westchester and Saratoga counties. We designed survey items and sampling techniques that allowed us to measure experience in four different ways:

1. direct neutral experience (e.g., observing a coyote)
2. direct negative experience (e.g., feeling threatened by a coyote)
3. tenure of residence in an area with coyotes
4. duration of coyote presence

We used binary logistic regression to examine the potential link between these different types of experience and attitudes and risk perceptions related to coyotes. Neutral and negative experience were significant predictors of attitudes about coyotes and risk perceptions of coyotes in most of the final regression models. In general, neutral experience predicted more positive attitudes and lower perceived risk than did negative experience. Tenure of residence was not a factor in our final models, but duration of coyote presence was present in several models. In the area where coyotes had been present the longest, residents expressed more positive attitudes and lower perceived risk than residents living in areas where coyotes are more recent arrivals. Our results imply that understanding individuals' experience with coyotes, or possibly other carnivores, may help managers to anticipate public sentiment and therefore support for carnivore management and conservation initiatives.

ACKNOWLEDGMENTS

We would like to thank the many individuals and organizations that have contributed to this research. We are grateful to all of the community members in Westchester and Saratoga counties who offered their insights through the telephone surveys. New York State Department of Environmental Conservation personnel on the Coyote Project Contact Team have been integral to the research planning process and regularly provided guidance. We thank Gordon Batcheller, Lou Berchielli, Mike Putnam, Scott Smith, Andy MacDuff, Wayne Masters, and Marie Kautz for their involvement with this work. Our collaborators at Cornell, Paul Curtis and Daniel Bogan, aided with the identification of study areas. The faculty, staff, and students in the Human Dimensions Research Unit at Cornell University provided valuable input and support to all aspects of the project. Our cooperating partners, Cornell Cooperative Extension of Westchester County (CCE) and Westchester County Department of Parks, Recreation and Conservation, contributed an important connection to our study communities. In particular we thank Jeanne Wilcox and Jim Lee with CCE and Jeff Main and Beth Herr with the Parks Department.

The cover photo (Billie Cromwell, Pennsylvania Game Commission, retired) was used with permission.

Funding for this project was provided by the New York State Department of Environmental Conservation through a grant under the Federal Wildlife in Restoration (Pittman-Robertson) program and by the Cornell University Agricultural Experiment Station federal formula funds, Project Number NYC-47433, received from Cooperative State Research, Education and Extension Service, U.S. Department of Agriculture.

TABLE OF CONTENTS

List of Tables

INTRODUCTION

Coyotes in New York State: An exploration of human-carnivore experience

As part of an eastward range expansion in the United States (Gompper 2002), coyotes (*Canis latrans*) established populations throughout New York State (NY) during the last half-century (Fener et al. 2005). During this same period, extensive suburban and exurban development occurred across NY (Brown et al. 2005, Pendall 2003), fragmenting and urbanizing previously open landscapes with moderately dense human populations. Opportunistic coyotes are able to exploit the resources available in created, suburban habitats (Fedriani et al. 2001, Grinder and Krausman 2001, Quinn 1997), leading to greater overlap of the spaces inhabited by humans and coyotes. Consequently, the opportunity for encounters between people and coyotes has increased.

In 2005, state wildlife managers identified an increase in the number of incidents with coyotes reported by residents in some counties of NY. To evaluate the management context, they initiated a situation analysis in a suburban area that had a particularly high incidence of reports. Telephone survey respondents who told of encounters with coyotes tended to have more positive attitudes toward the species than those with less experience (Wieczorek Hudenko et al. 2008).

For the wildlife professional seeking to promote carnivore conservation in landscapes undergoing rapid change, human-coyote encounters taking place in suburban areas across the state represent a promising research/learning opportunity. Steady expansion of coyote ranges in NY over approximately the last 60 years has created a temporal gradient of coyote presence and potential for human experience with coyotes that allows for comparison between communities with very different histories of coyote occupation. Moreover, focusing on suburban human-coyote interactions may have broad utility because suburban areas are at the forefront of issues related to both conservation and conflict management for a range of carnivore species (Bjurlin and Cypher 2005, Conover 2002).

Report purpose

Our initial findings indicated a relation between experience with coyotes and perceptions about coyotes (Wieczorek Hudenko et al. 2008). This information, together with conflicting results from previous studies about experience with and attitudes towards carnivores, indicated that a follow-up analysis specifically to examine the effect of experience on coyote-related attitudes and risk perceptions would be beneficial. In this publication, we present the findings from our analyses, which shed light on the relation between experience with coyotes and people's attitudes about coyotes and perceptions of coyote-related risks.

We begin this report with a brief review of related literature and the research hypotheses we tested through our analysis. Following a summary of methods and analysis, we present our findings. We conclude with a discussion of findings and implications for carnivore conservation and management.

LITERATURE REVIEW

As expanding carnivore populations and ever-increasing exurban and urban land development bring people and carnivores close together, encounters between them will become more frequent. Balancing ecological and sociological impacts of human-carnivore encounters will be challenging for wildlife managers, in part because human perspectives about carnivores are often polarized and carnivore conservation and management can become highly controversial (Bisi et al. 2007, Clark et al. 1996, Treves and Karanth 2003). Knowledge about the human dimensions of carnivore issues can help managers mitigate existing conflict and anticipate potential problems (Vaske et al. 2001).

Understanding stakeholder concerns about negative interactions with carnivores and perceptions of carnivore-related risks is important for managing conflicts between humans and carnivores. Concerns about carnivore-related impacts and perceptions of carnivore-related risks are assumed to influence stakeholder tolerance of species (e.g., Kleiven et al. 2004), acceptance of conservation or management strategies (e.g., Zinn and Pierce 2002), and the sociopolitical context for carnivore management decisions (e.g., Treves and Karanth 2003).

Experience with carnivores

Experience with a carnivore is one independent variable potentially influencing attitudes and risk perceptions that has been explored in numerous ways for a variety of carnivore species in North American and Europe. This factor in particular may be relevant to understanding human perspectives on carnivore species because both direct (e.g., seeing a carnivore) and indirect (e.g., hearing about a human-carnivore interaction on the news) experience may result in positive or negative impacts for people. Recent trends in human dimensions literature highlight the importance of impact-focused management to find solutions to wildlife issues (Riley et al. 2002). Furthermore, as the contact between humans and carnivores increases, people will gain experience with these species. This expectation elevates the importance of experience as a factor influencing management and decision-making.

Direct experience

Research about the effect of experience on attitudes and risk perceptions is not conclusive. Experience has been examined in different ways across studies, so generalizations about experience are difficult to make with confidence. For example, direct experience with a carnivore, such as seeing an animal, was found to predict more positive attitudes (Bjurlin and Cypher 2005, Casey et al. 2005). In other instances, direct experience, measured as incurring loss due to predation from a carnivore, led to more negative attitudes (Ericsson and Heberlein, 2003, Naughton-Treves et al. 2003). While one might assume this contradiction comes from the measurement of benign versus negative experience, Williams et al. (2002) conducted a meta-analysis of 37 wolf attitude surveys and concluded that direct experience with wolves (*Canis lupus*) would likely lead to an overall decrease in positive attitudes, *regardless* of experience type.

History of carnivore presence

Several inquiries have measured attitudes using the presence or absence of carnivores in an area as a proxy for experience. Measuring experience in this way has not yielded consistent results. Studies report that carnivore presence is associated with increased positive attitudes (Bath and Majic, 2000, Kellert 1985) as well as increased negative attitudes (Ericsson and Heberlein 2003, Williams et al. 2002). Karlsson and Sjöström (2007) revealed that the further away from a wolf territory people lived, the more positive their attitudes about wolf conservation. Bath et al. (2008) evaluated the presence of lynx (*Lynx lynx*) in Poland, and found that it was a significant variable associated with increased positive attitudes in some sample groups (e.g., foresters) and decreased positive attitudes in others (e.g., farmers).

Research examining duration of experience with a carnivore also provides mixed results. Increased duration of experience has been associated with both positive attitudes (Zimmermann et al. 2001) and negative attitudes (Williams et al. 2002); it also has been found to have no effect on attitudes (Casey et al. 2005). Understanding of this apparent discrepancy has been aided by studies demonstrating the importance of timeframe when evaluating attitudes toward carnivores. Based on their review of 13 carnivore attitude studies, Zimmermann et al. (2001) concluded that a sequence of attitude change occurs over time. Across the attitude studies, negative attitudes toward a carnivore species increased as the animal's range expanded toward the residence of people surveyed. Negative attitudes peaked when the range of the species was adjacent to or included the area inhabited by people surveyed, but this was not a permanent perspective. Over time, as experience with the animal accumulated, negative attitudes declined. Prolonged exposure to sharing a geographic area with a carnivore species was associated with less negative attitudes than when the species was newly colonizing the area. More recent studies also revealed that attitudes tend to be more negative in areas where carnivore species are relatively new arrivals (Bisi et al. 2007), and more positive in areas where there are either no carnivores or where carnivores have been established for many years (Bath et al. 2008). While carefully evaluating the timeframe associated with duration of experience may help to clarify understanding of human-carnivore relationships, it does not resolve all discrepancies. In contrast to the studies mentioned above, some studies find that attitudes become more negative with experience, over similar timeframes (Ericsson and Heberlein 2003).

Risk perception and experience

Results for work examining the relationship between experience and risk perceptions are equally inconclusive. As humans and carnivores coexist in the same area over time, people's experiences with a particular species are likely to increase familiarity with, knowledge of, and certainty about the species, factors presumed to lower risk perception (Slovic 1987). In some instances, people who have experience with a carnivore perceive less risk from it (Bjurlin and Cypher 2005, Røskaft et al. 2003) and those with little experience express more concern about the animal (Siemer 2008). Similarly, some studies report that carnivore acceptance in certain communities, an indication of lower perceived risk, increases over time with greater exposure to carnivores (Bath et al. 2008, Harrison 1998). In contrast, other studies demonstrate that risk perception variables such as control may not improve with greater carnivore experience, and therefore may lead to less tolerance for a species (Kleiven et al. 2004). Even if an individual has

low cognitive risk perceptions, and from experience understands that the threat of injury from a carnivore is a low probability event, affective risk perceptions based on the perceived threat may be elevated (Riley and Decker 2000).

Findings from studies that examine experience illustrate the complexities that confound our understanding of the way experience influences attitudes and risk perceptions. This situation suggests that continued exploration of experience, both conceptually and to refine measurement, will contribute significantly to conservation and management of carnivores.

Our research hypotheses

Drawing from prior work on attitudes and perceptions of risk related to experience with carnivores (e.g., Bath et al. 2008; Ericsson and Heberlein 2003; Zimmermann et al. 2001), we examined this concept using four different measures. Previous studies have defined experience in a variety of ways (e.g., direct experience, presence of a carnivore) but rarely have multiple conceptualizations of experience been evaluated within the same inquiry. Due to the temporal gradient of coyote presence in NY and the recent expansion of many exurban and suburban areas, we were able to operationalize experience in four different ways. We explored experience based on: direct experience with a coyote (neutral [e.g., observing a coyote] and negative [e.g., feeling threatened by a coyote]), how long coyotes had lived in an area, and how long a person had lived in an area with a history of coyote presence. Our hypotheses were:

- H_1: People with neutral experience with coyotes will have: (a) more positive attitudes and (b) lower perceptions of risk than people with less neutral experience.
- H_2: People with negative experience with coyotes will have: (a) more negative attitudes and (b) higher perceptions of risk than people with less negative coyote experience.
- H_3: People with a longer tenure of residence in an area with a "long" history of coyote presence will have: (a) more positive attitudes and (b) lower perceptions of risk than newcomers to the area.
- H_4: People living in an area with a longer duration of coyote presence will have: (a) more positive attitudes and (b) lower perceptions of risk than people living in an area with a shorter duration of coyote presence.

METHODS

Study areas

The initial inquiry took place in Westchester County, NY. An apparent increase in coyote incident reports coming from Westchester County led the New York State Department of Environmental Conservation (NYSDEC) to initiate a situation analysis in the area to assist management planning and decision-making. Additionally, Westchester's suburban development characteristics led agency staff to believe that the potential existed for human-coyote conflict to escalate, making this area of particular management interest (NYSDEC staff, personal communication, August, 2005). This portion of the study focused on four different towns within Westchester County (for a map of the study area, see Wieczorek Hudenko et al. 2008). The

towns were selected to reflect the range of land-use patterns present in Westchester County so that results could be generalized to the county level.

Coyotes expanded their ranges into NY in a southward movement from Canada. As a result, coyotes have been present in northern NY for at least 60 years, while they have inhabited southern regions (e.g., Westchester County) for a much shorter time (≈ 20 years) (Fener et al., 2005). A suburban area in northern NY (Saratoga County) that is believed to have had coyotes present since the 1940s was selected to examine the manner in which experience with coyotes might influence attitudes and risk perceptions. The study in Saratoga County allowed us to evaluate attitudes and risk perceptions in an area where coyotes had been present for a substantial period of time, and compare those data to similar data from residents of Westchester County, where coyotes were relatively new inhabitants. We sampled residents from the suburbs of the city of Saratoga Springs, specifically focusing on towns with similar housing densities to those in the Westchester County study area to maximize the similarities in land-development patterns between them.

Questionnaire items

Measures of experience

A telephone survey instrument was developed to collect data (survey instrument available in Wieczorek Hudenko et al. 2008). Respondents' direct experience with coyotes was measured using several items similar to those used in other carnivore studies (Ericsson and Heberlein 2003, Naughton-Treves et al. 2003). Respondents were asked if they had seen a coyote in the county, how many times they had seen a coyote, if they had seen a coyote near their residence, if they had ever had a problem with a coyote, if they had ever been in a situation where they felt a pet might be harmed by a coyote, and if they had ever been in a situation where they felt they or a family member might be harmed by a coyote. Saratoga residents were also asked if they grew up in an area with coyotes; data from this measure counted toward experience only for the comparison within Saratoga County, not between Westchester and Saratoga counties. Response options to all of these items were "yes," "no," and "don't know."

Measures of experience based on tenure of residence and duration of coyote presence were operationalized through the sampling strategies. Tenure of residence was assessed based on how long a resident had lived in Saratoga County. Respondents from Saratoga County were used to examine this aspect of experience because of the area's history of established coyote presence. Experience related to duration of coyote presence was measured by sampling from areas with different time periods of verified coyote population establishment (Westchester and Saratoga counties).

Measures of attitude and risk perception

The questionnaire had three items measuring attitudes that were conceptually similar to other inquires about attitudes toward carnivores (Ericsson and Heberlein 2003, Kellert 1985). Respondents were asked if they were pleased that coyotes lived in their area, thought coyotes were a valuable part of the wildlife that lived in their area, and were concerned about coyote

presence in their area. Four risk perception questions were included on the questionnaire, two questions assessing cognitive risk, and two assessing affective risk. Cognitive risk questions were stated as follows, "The likelihood that a pet/person will be injured by a coyote in [name] County is acceptably low." Response options for the attitude and cognitive risk perception questions were on a four-point Likert-type scale, ranging from "strongly agree" to "strongly disagree." To assess affective risk, respondents were asked "How would you describe your level of concern about the threat coyotes might present to pets/small children in your area?" Response options for the affective risk questions were "no concern," "some concern," and "a great deal of concern."

Additional measures

Previous studies have linked various sociodemographic characteristics and individual behaviors with attitudes and risk perceptions about carnivores (Bjerke et al. 1998, Bjurlin and Cypher 2005, Casey et al. 2005, Harrison 1998, Kellert 1985, Pate et al. 1996, Stevens et al. 1994, Zinn and Pierce 2002). Included in our survey instruments were measures of respondents' age and highest level of education. We also asked respondents if they engaged hunting, whether they had pets, and whether they fed pets outdoors. A number of other measures were also included in the questionnaire because the survey instrument was designed as part of an overall situation analysis. Among these measures was a screening question designed to direct people with a concern or interest in coyote issues (about half of the total sample group from each county) to an in-depth version of the questionnaire that included the attitude and risk perception questions described above. Data regarding measures not used in this manuscript are described elsewhere (Wieczorek Hudenko et al. 2008).

The questionnaire was reviewed by and pre-tested with Cornell University staff, members of the NYSDEC furbearer management team, staff with cooperating partners (Cornell Cooperative Extension and Westchester County Department of Parks, Recreation and Conservation), and several residents; it was then refined for use in the survey. The Cornell University Committee on Human Subjects approved the questionnaire and research protocol (Protocol ID# 06-05-045).

Implementation

Cornell University's Survey Research Institute (SRI) implemented the telephone survey. SRI obtained a random sample of Westchester and Saratoga county residents in the study towns from Genesys Sampling Systems (Fort Washington, PA). The sample was drawn from records of listed household telephone numbers. Although an estimated 7-9% of Americans no longer use a landline, a recent study demonstrated that the exclusion of these individuals has minimal impact on telephone survey results (Pew Research Center, 2006). To address H_4, the first question on the Saratoga County survey instrument screened residents based on tenure of residence within the county. Eligible respondents were those who reported living in Saratoga County for 5 years or less or 21 years or more.

SRI initiated the Westchester County telephone survey on October 10, 2006 and ended interviewing on November 3, 2006. The Saratoga County survey was implemented between June 2, 2007 and August 1, 2007.

Operationalizing key concepts

Experience (independent variables)

Four independent variables were used to measure experience (*neutral experience*, *negative experience*, *tenure of residence*, and *duration of coyote presence*); each variable corresponded with one hypothesis. Two of the experience variables were operationalized by creating multi-item indices to measure residents' experience with coyotes by type (neutral or negative), similar to the process used by Ericsson and Heberlein (2003). The variable *neutral experience* was operationalized using three measures from the telephone questionnaire: (1) have you seen a coyote in the county; (2) how many times have you seen a coyote; (3) and have you seen a coyote near your home. For analyses of Saratoga residents, the *neutral experience* variable included an additional measure from the questionnaire: did you grow up in an area with coyotes. The *negative experience* variable was also generated from three measures on the telephone questionnaire: (1) have you ever had a problem with a coyote; (2) have you ever felt a pet was threatened by a coyote; (3) have you ever felt a person was threatened by a coyote.

The experience variable *tenure of residence* in an area with coyotes was operationalized using the Saratoga County sub-samples, defined as newcomers (living in Saratoga County 5 years or less) and longtimers (living in Saratoga County 21 years or more). Previous studies suggest that living with a carnivore species for approximately 10-15 years can lead to a change in attitudes (Bath et al. 2008, Zimmermann et al. 2001). Consequently, we used the 5- and 21-year cutoffs to capture possible differences in attitudes associated with the amount of time one has lived with coyotes.

The final experience variable, *duration of coyote presence*, was operationalized using the long-term residents of both Westchester and Saratoga counties. Similar variables have been used in other studies to examine possible effects of carnivore presence based on a temporal gradient (Bath et al. 2008, Zimmermann et al. 2001). As this aspect of experience was intended to evaluate the effects of history of coyote presence in an area, only long-term residents in the samples would have had the opportunity to experience duration of coyote presence differently between the two communities.

Attitude and risk perception (dependent variables)

We collapsed the response options on attitude and risk perception variables due to low counts in several categories. Dichotomous variables for these measures were created and coded as either agree/disagree or concern/no concern. Williams et al. (2002) used a similar technique in a meta-analysis of wolf attitude surveys. The authors suggest that despite variation in wording of questions and responses, the concept of interest, either a positive or negative attitude, is not lost with dichotomous coding.

Analysis

Binary logistic regressions were conducted to determine which variables predicted attitudes and risk perceptions of coyotes. Attitude and risk perception measures were kept separate because each of the three attitude measures had a different valence and could potentially cancel one another out in a scale, and the risk items examined different types of risk perceptions. Two models for each attitude and risk perception question were generated because the sampling strategy for the tenure of residence and duration of coyote presence variables created two sub-samples. One model for each attitude and risk perception question was created for respondents from Saratoga County that included tenure of residence (newcomer or longtimer) and neutral and negative experience. Another model for each question was generated using longtime residents in Westchester and Saratoga counties. This model included the duration of coyote presence variable as well as the neutral and negative experience variables. The goal of this approach was to evaluate not only whether experiences influenced these measures, but also whether the different kinds of experience influenced different types of attitudes or risk perceptions. To control for sociodemographic and behavior variables that might also influence attitudes and risk perceptions, several were included in the regression models: age, area where respondent lives (town, suburb, scattered houses with green space), education level, children under six in household, cat or dog in household, bird or wildlife feeding, feeding pets outdoors, curbing garbage at night, hunting, and gender.

Cross-tabulations with Pearson's chi-square analysis were used to examine differences in sample groups. Chi-square analyses were performed to compare people who completed the in-depth questionnaire with those who did not, to describe the characteristics of our survey respondents. While some differences were found, because of the nature of the inquiry we did not believe these differences affected analysis and did not weight the data. As a follow-up to the regression analyses results, chi-square analyses were also performed for the newcomers and longtimers in Saratoga County. All statistics were performed with SPSS statistical software (v. 16.0).

RESULTS

A total of 1160 individuals responded to the Westchester County survey. Seven hundred of them were longtime residents, living in Westchester for 21 years or more, and therefore eligible for comparison to the Saratoga sample. As a result of the screening question, 372 of these longtime Westchester residents answered the attitude and risk perception questions. For the Saratoga survey, a total of 1438 people were interviewed, 705 newcomers and 733 longtimers. Five hundred and forty respondents (250 newcomers and 290 longtimers) in this sample completed the in-depth version of the interview and answered the attitude and risk perception questions. Of the individuals reached by telephone, 87% (Westchester County) and 83% (Saratoga County) completed an interview.

Of the Westchester and Saratoga longtimers, those who completed the in-depth questionnaire were more likely to have children (13.1% vs. 9.6%, $\chi^2 = 4.26$, $df = 1$, $p < .05$), to have a dog (34.0% vs. 28.6%, = 4.69, $df = 1$, $p < .05$), and to be female (62.3% vs. 50.5%, $\chi^2 = 19.88$, $df = 1$, $p < .001$), and less likely to have a cat (26.6% vs. 32.3%, $\chi^2 = 5.46$, $df = 1$, $p <$

.05) and to feed birds (51.6% vs. 58.7%, $\chi^2 = 7.22$, $df = 1$, $p < .01$) than individuals who did not answer the attitude and risk perception questions. The Saratoga newcomers and longtimers who completed the in-depth questionnaire were more likely to have a dog (38.5% vs. 31.8%, $\chi^2 = 6.81$, $df = 1$, $p < .01$) and more likely to be female (60.7% vs. 52.9%, $\chi^2 = 8.24$, $df = 1$, $p < .01$) than those who were screened out.

Response frequencies and percentages for measures used in the regression analysis are listed in Appendix A.

Neutral experience

Neutral experience was a significant variable in several of the logistic regression models for attitudes and risk perception questions. Longtime residents in both Westchester and Saratoga counties with more neutral coyote experience were generally more likely to be pleased about coyote presence in their county and less likely to be concerned about coyotes in their area than residents with less neutral experience (Table 1). These individuals with more neutral experience were also less likely to find the likelihood of injury to pets from coyotes acceptable, and were more likely to express concern about possible threats to pets than people with less neutral experience. Neutral experience increased the odds that Saratoga County newcomers and longtimers were pleased about coyotes and decreased the odds that they reported concern about coyotes in their area (Table 2).

Negative experience

All of the models for attitude and risk perception questions contained negative experience with coyotes as a significant predictor variable with the exception of the model for one of the affective risk perception questions (concern about the threat coyotes might pose to small children). This was true for the models for both longtime residents in the two counties (Table 1) and for the Saratoga County newcomer and longtimer sample (Table 2). In general, negative experience increased the odds that respondents expressed negative attitudes. Negative experience also increased the odds that individuals would report higher cognitive and affective risk perceptions.

Tenure of residence

Tenure of residence in an area with a history of coyote presence was not a significant variable in any of the final logistic regression models. To examine this variable further, chi-square analyses were conducted to compare differences between newcomer and longtime resident samples. No statistically significant differences were found in responses on any of the attitude or risk perception questions.

Table 1. Attitudes, cognitive, and affective risk: logistic regression outcomes for longtime residents (21 or more years residence) in Westchester and Saratoga counties.

Dependent variables	**Independent variables**								
	Neutral experience	Negative experience	Duration coyote presence	Gender	Hunting	Cat owner	Age	Young child	Feed birds
Attitudes									
Pleased coyotes live in area (ROC = .722)									
Exp(β)	1.153*	0.692*	0.639*	0.458***	0.373*	2.243***	0.973***	—	0.604*
Value coyote presence (ROC = .680)									
Exp(β)	—	0.669**	—	—	—	1.934**	0.970***	—	1.638**
Concerned about coy. (ROC = .617)									
Exp(β)	0.831***	1.915**	1.493*	—	—	—	—	—	—
Cognitive Risk									
Likelihood of injury to pet Accept. low (ROC = .676)									
Exp(β)	0.860**	0.433***	—	0.545**	—	—	—	2.145**	—
Likelihood of injury to pet human accept. low (ROC = .639)									
Exp(β)	—	0.700*	—	0.545**	0.417*	2.314 ***	—	1.953*	—
Affective Risk									
Concern about threat to pet (ROC = .685)									
Exp(β)	1.211*	3.522**	—	—	0.317**	—	—	—	—
Concern about threat to young child (ROC = .672)									
Exp(β)	—	—	1.720*	—	—	0.421*	—	—	2.031*

*$p < .05$ **$p < .01$ ***$p < .001$

Table 2. Attitudes, cognitive, and affective risk: logistic regression outcomes for newcomers (5 years or less) and longtime residents (21 or more years residence) in Saratoga County.

Dependent variables		**Independent variables**							
		Neutral experience	Negative experience	Gender	Hunting	Cat owner	Age	Young child	Feed birds
Attitudes									
Pleased coyotes live in area (ROC = .587)	Exp(β)	1.144*	0.583**	—	—	1.544*		—	—
Value coyote presence (ROC = .669)	Exp(β)	—	0.631**	—	0.545	—	0.970***	1.764	—
Concerned about coy. (ROC = .648)	Exp(β)	0.840**	2.121**	1.505*	—	—	—	—	—
Cognitive Risk									
Likelihood of injury to pet Accept. low (ROC = .634)	Exp(β)	—	0.450***	0.599**	—	—	—	—	1.672*
Likelihood of injury to pet human accept. low (ROC = .632)	Exp(β)	—	0.658*	—	—	2.195**	—	—	2.194**
Affective Risk									
Concern about threat to pet (ROC = .657)	Exp(β)	—	2.133*	2.256**	—	—	—	—	—
Concern about threat to young child (ROC = .611)	Exp(β)	—	—	—	0.399**	0.528*	—	—	—

*$p < .05$ **$p < .01$ ***$p < .001$

Duration of coyote presence

Three attitude and risk perception models were influenced by the duration of coyote presence variable. The odds of being pleased about coyotes were lower for people living in an area with a shorter history of coyote presence (Table 1). This same sample group had higher odds of being concerned about coyotes in general and about the possible threat coyotes pose to children. This factor may have been significant in another model, the possible threat coyotes pose to pets, but there was an interaction effect between county of residence and cat ownership ($\beta = 1.439$, $df = 1$, $p < .05$).

Other independent variables of interest in the models

Many other independent variables were significant in several of the logistic regression models (Tables 1-2). Gender was the predictor variable that appeared most often and most consistently in the models. In general females had greater odds of expressing negative attitudes and higher perceived risk than did males. While hunters in the longtime sub-sample were more likely to be pleased about coyote presence and be less concerned about possible threats to pets and small children, they were less likely than non-hunters to agree that the likelihood of an injury to humans was acceptable. Having a cat in the household increased the odds of expressing positive attitudes and decreased the odds of reporting higher perceived risk. Individuals with children under the age of six in the household were more likely to find the risk to pets and humans acceptable than respondents without children. Age was a significant variable only in three attitude models and indicated that for those questions, older individuals were less likely to have positive attitudes about coyotes. Respondents who fed birds or other wildlife, or owned a dog had higher odds of expressing positive attitudes in three of the models.

DISCUSSION

General support was found for three hypotheses (H_1, H_2, and H_4) concerning the way in which different types of experience affect attitudes and perceptions of risk associated with coyotes. Similar to other studies, however, our findings also indicate that understanding the influence of experience is complex and difficult to reveal in a single study. This was evidenced by the fact that one hypothesis was not supported (H_3), and one other was only partially supported (H_{1a}). Nevertheless, some important conclusions can be drawn from this work that contribute to the growing body of literature exploring the effects of experience with carnivores on people's attitudes and perceptions of risk associated with them.

Among experience variables, negative experience with coyotes had the most consistent influence and was present in most of the models. Respondents who had a greater amount of negative experience with coyotes were less likely than people with less negative experience to express positive attitudes, and more likely to report negative attitudes and greater perceived risk from coyotes. Neutral experience was also a significant factor in many of the models; respondents with a greater amount of neutral coyote experience were more likely than people with less neutral experience to be pleased about coyote presence and less likely to be concerned. These outcomes supported H_{1a} and H_{2a} and H_{2b}. For measures where both neutral and negative experience were included in the final regression models, neutral experience had a greater

influence on positive attitudes and negative experience had a greater influence on negative attitudes and risk perception measures. This may be interpreted as further support for the hypotheses and suggests that the specific type of experience, or the impacts resulting from experience, are relevant to formulation of attitudes and risk perceptions. In the models that included issues related to pets, however, neutral and negative experience influenced responses similarly. Perhaps any experience with coyotes, whether neutral or negative, heightens residents' attention to the presence of coyotes if they own a pet. While individuals might be more familiar with and knowledgeable about coyotes from their neutral experience and therefore not express as much concern and be more apt to appreciate their presence, they may also be more aware of the potential threats coyotes pose to pets. Furthermore, while respondents with neutral experience were more likely to be concerned about threats to pets, this effect was not on the same order of magnitude as negative experience. In this framework, the increased concern about pets, even for people with neutral experience, may be understandable and not necessarily contradict the ideas that in general neutral experience may lead to greater tolerance for coyotes overall.

Analyses yielded little evidence that tenure of residence in an area with coyotes (H_3) influenced attitudes or risk perceptions. While preliminary work in Westchester County led us to speculate that the "less than five years" designation for newcomers would reveal differences in attitudes and risk perceptions (Wieczorek Hudenko et al. 2008), that was not the case for the Saratoga County sample, selected specifically to evaluate this hypothesis. Perhaps people experience both the direct and indirect effects of living with a coyote in a shorter time frame, especially in a community where coyotes have been established for some time, as they have in Saratoga County. We were unable to evaluate this possibility with the current study because sample sizes of respondents with one, two, three, and four years of residence in the county were too small for analysis.

Duration of coyote presence in an area was a significant factor in three models and the results supported the predictions (H_4). Westchester County respondents, where coyotes have been present for a shorter period of time, were less likely than Saratoga County residents to be pleased about coyotes and more likely to be concerned about coyote presence in general and about possible threats to children. These findings are in accordance with previous studies (Zimmermann et al. 2001). We are unsure why the factor was not significant in more of the models. It may be that coyotes have been living in Westchester County for a sufficient period of time for people to adjust and have experiences and attitudes similar to individuals in areas where coyotes have long been establish, such as Saratoga County. The utility of this variable is that it assesses the potential influence of direct experience as well as indirect experience and social factors. In recognition of the fact that few people may have direct experience with a carnivore, measurement of these other aspects associated with living in an area with a carnivore may be particularly relevant (Karlsson and Sjöström 2007). When both direct and indirect experiences are combined into one independent measure, such as how long a species has inhabited an area, the nuances of indirect experience may not be revealed. This could also be the case with the *duration of coyote presence* variable. If the components represented by this factor had been measured and evaluated separately, we may have found they were part of the attitude and risk perception models. While there may be ways to gain a more precise understanding of the impact of coyote presence on the dependent variables, *duration of coyote presence* did influence the

models in the expected direction and contributed insight to the effect of living in an area with carnivores.

Gender and age affected dependent variables much like the findings from previous carnivore studies (Kellert 1985, Kleiven et al. 2004, Røskaft et al. 2003, Williams et al. 2002). Females and older residents were more likely to perceive risk from coyotes and express negative attitudes, and were less likely to report positive attitudes. The results for hunters were mixed, but seemed in accordance with other studies (Bath et al. 2008, Ericsson and Heberlein 2003). Hunters were more likely to be concerned about the potential threat coyotes pose to humans, and express fewer positive attitudes about coyotes. Hunters may have more knowledge about coyotes and therefore may have less concern about other aspects of coyote presence, such as threats to pets. Our results stand in contrast to what other studies have revealed about attitudes and perceived risk for people with a child (Zinn and Pierce 2002). In general, people with children in our study had higher odds of agreeing that the risk posed by coyotes to humans or pets was acceptable. This may be the case for respondents in this study because few people sampled had ever experienced being threatened (Wieczorek Hudenko et al. 2008), thus they might estimate the risk likelihood as relatively low. Furthermore, media coverage of coyote-related events in NY tends to focus on incidents with pets, so such sources of information available to our respondents also deemphasize the potential risk to humans. This finding may also simply be an anomaly in the data. Similar to other studies (Bjerke et al. 1998), respondents with cats were more likely to have more positive attitudes about coyotes and lower cognitive and affective risk perceptions about the threat to humans. Having cats did not influence cognitive or affective measures of pet-related risk perception. Perhaps people in this study predominantly have indoor cats, largely obviating concerns about coyote-pet conflicts. Alternatively, they may simply represent people with an affinity for animals who might be expected to be prone to express positive attitudes about coyotes.

IMPLICATIONS

Conservation and management

Understanding how experience with carnivores affects attitudes and risk perceptions will help wildlife professionals plan for the future of carnivore conservation and management in suburban and exurban areas. Experience has multiple dimensions that are relevant to everything from a single individual's behavior to community-level responses to policies or management actions. Examining experience will help managers anticipate reactions to reintroduced or expanding carnivore populations.

Studies demonstrate that residents' interpretations of interactions with carnivores can influence their attitudes and therefore support for conservation and management initiatives (Bjurlin and Cypher 2005, Kretser 2008). This study adds to these findings by illustrating that people's attitudes and perceptions of risk are significantly impacted by their individual, direct experiences with coyotes. The fact that neutral experience generally leads to more positive attitudes and lower perceived risk and negative experience has the opposite effect suggests that tolerance for carnivores can increase over time if negative impacts can be managed. Such information could help managers target early interventions aimed at fostering appreciation for carnivores from a distance through sightings (i.e., increasing neutral experience) and ensuring

that human behaviors that increase the risk of a negative encounter are controlled (i.e., minimizing negative experience).

Future research

Based on this study, it may not be optimal to use the variable *duration of coyote presence* as a proxy for experience. This variable likely fails to capture the full scope of effects of living with coyotes on attitudes and risk perceptions. Further research is needed to examine these effects for coyotes and other carnivore species. Focusing specifically on components of direct and indirect experience is likely to improve understanding of impacts resulting from carnivore presence. Aspects of direct experience such as what constitutes a neutral versus negative experience and what happens before, during, and after someone encounters a carnivore, will help to further refine application of the direct experience variable. A more thorough understanding of indirect experience also is warranted. Inquiry is needed to evaluate the components of indirect experience such as how people learn about carnivores, which carnivore-related topics are discussed in the community, and what social norms exist about interactions with carnivores. An understanding of these specific effects of living in an area with carnivores will help resolve some of the discrepancies in findings from this and other studies. Exploring these individual aspects of both direct and indirect experience will allow researchers to better understand the full spectrum of experience and how it influences attitudes and risk perceptions important to carnivore conservation and management.

LITERATURE CITED

Bath, A. J., and A. Majic. 2000. Human dimensions in wolf management in Croatia: Understanding attitudes and beliefs of residents in Gorski Kotar, Lika, and Dalmatia toward wolves and wolf management (Report for the Large Carniovre Initiative for Europe). Memorial Unversity of Newfoundland, St. John's, Canada. Available at www.lcie.org (accessed June 2008).

Bath, A., A. Olszanska, and H. Okarma. 2008. From a human dimensions perspective, the unknown large carnivore: Public attitudes toward Eurasian lynx in Poland. Human Dimensions of Wildlife 13(1):31-46.

Bisi, J., S. Kurki, M. Svensberg, and T. Liukkonen. 2007. Human dimensions of wolf (*Canis lupus*) conflicts in Finland. European Journal of Wildlife Research 53(4):304-314.

Bjerke, T., O. Retan, and S. R. Kellert. 1998. Attitudes toward wolves in southeastern Norway. Society and Natural Resources 11(2):169-178.

Bjurlin, C. D., and B. L. Cypher. 2005. Encounter frequency with the urbanized San Joaquin kit fox correlates with public beliefs and attitudes toward the species. Endangered Species Update 22(3):107-115.

Brown, D. G., K. M. Johnaon, T. R. Loveland, and D. M. Theobald. 2005. Rural land-use trends in the conterminous United States, 1950-2000. Ecological Applications 15(6):1851-1863.

Casey, A. L., P. R. Krausman, W. W. Shaw, and H. G. Shaw. 2005. Knowledge of and attitudes toward mountain lions: A public survey of residents adjacent to Saguaro National Park, Arizona. Human Dimensions of Wildlife 10(1):29-38.

Clark, T. W., A. P. Curlee, and R. P. Reading. 1996. Crafting effective solutions to the large carnivore conservation problem. Conservation Biology 10(4):940-948.

Conover, M. 2002. Resolving human-wildlife conflicts: The science of wildlife damage management. Boca Raton, FL: CRC Press LLC.

Ericsson, G., and T. A. Heberlein. 2003. Attitudes of hunters, locals, and the general public in Sweden now that the wolves are back. Biological Conservation 111(2):149-159.

Fedriani, J. M., T. K. Fuller, and R. M. Sauvajot. 2001. Does availability of anthropogenic food enhance densities of omnivorous mammals? An example with coyotes in southern California. Ecography 24(3):325-331.

Fener, H. M., J. R. Ginsberg, E. W. Sanderson, and M. E. Gompper. 2005. Chronology of range expansion of the coyote, Canis latrans, in New York. Canadian Field-Naturalist 119(1):1-5.

Gompper, M. E. 2002. Top carnivores in the suburbs? Ecological and conservation issues raised by colonization of northeastern North America by coyotes. Bioscience 52(2):185-190.

Gore, M. L., B. A. Knuth, P. D. Curtis, and J. E. Shanahan. 2006. Stakeholder perceptions of risk associated with human black bear conflicts in New York's Adirondack Park campgrounds: Implications for theory and practice. Wildlife Society Bulletin 34(1):36-43.

Grinder, M. I., and P. R. Krausman. 2001. Home range, habitat use, and nocturnal activity of coyotes in an urban environment. Journal of Wildlife Management 65(4):887-898.

Harrison, R. L. 1998. Bobcats in residential areas: Distribution and homeowner attitudes. Southwestern Naturalist 43(4):469-475.

Karlsson, J. & Sjöström, M. 2007. Human attitudes towards wolves, a matter of distance. Biological Conservation 137(4):610-616.

Naughton-Treves, L., R. Grossberg, and A. Treves. 2003. Paying for tolerance: Rural citizens attitudes toward wolf depredation and compensation. Conservation Biology 17(6):1500-1511.

Kellert, S. R. 1985. Public perceptions of predators, particularly the wolf and coyote. Biological Conservation 31(2):167-189.

Kleiven, J., T. Bjerke, and B. P. Kaltenborn. 2004. Factors influencing the social acceptability of large carnivore behaviours. Biodiversity and Conservation 13(9):1647-1658.

Kretser, H. E. 2008. The exurban frontier: Anticipating human-wildlife interactions where we live, work, and play. Doctoral dissertation, Cornell University, Ithaca, NY.

Pate, J., M. J. Manfredo, A. D. Bright, and G. Tischbein. 1994. Coloradans' attitudes toward reintroducing the gray wolf into Colorado. Wildlife Society Bulletin 24(3):421-428.

Pendall, R. 2003. Sprawl without growth: The upstate paradox. Washington, DC: Brookings Institution Center on Urban and Metropolitan Policy.

Pew Research Center. 2006. National polls not undermined by growing cell only population: The cell phone challenge to survey research, [News release, May 15]. Washington D.C.: The Pew Research Center for the People and the Press.

Quinn, T. 1997. Coyote (*Canis latrans*) food habits in three urban habitat types of western Washington. Northwest Science 71(1):1-5.

Riley, S. J., and D. J. Decker. 2000. Risk perception as a factor in wildlife stakeholder acceptance capacity for cougars in Montana. Human Dimensions of Wildlife 5(3):50-62.

Riley, S. J., D. J. Decker, L. H. Carpenter, J. F. Organ, W. F. Siemer, G. F. Mattfeld, and G. Parsons. 2002. The essence of wildlife management. Wildlife Society Bulletin 30(2):585-593.

Røskaft, E., T. Bjerke, B. Kaltenborn, J. D. C. Linnell, and R. Andersen. 2003. Patterns of self-reported fear towards large canrnivores among the Norwegian public. Evolution and Human Behavior 24(3):184-198.

Siemer, W. F. 2008. Effects of mass media exposure on perception of risk from black bears. Unpublished manuscript.

Slovic, P. 1987. Perception of risk. Science 236(4799):280-285.

Stevens, T. H., T. A. More, and R. J. Glass. 1994. Public attitudes about coyotes in New England. Society and Natural Resources 7(1):57-66.

Treves, A., and K. U. Karanth. 2003. Human-carnivore conflict and perspectives on carnivore management worldwide. Conservation Biology 17(6):1491-1499.

Vaske, J. J., D. C. Fulton, and M. J. Manfredo. 2001. Human dimensions considerations in wildlife management planning. Pages 91-108 in D. J., Decker, T. L. Brown, and W. F. Siemer (Eds.), Human Dimensions of Wildlife Management in North America. Bethesda, MD: The Wildlife Society.

Wieczorek Hudenko, H., W. F. Siemer, and D. J. Decker. 2008. Living with coyotes in suburban areas: Insights from two New York counties. Human Dimensions Research Unit Series Publication 08-7. Ithaca, NY: Cornell University.

Williams, C. K., W. G. Ericsson, and T. A. Heberlein. 2002. A quantitative summary of attitudes toward wolves and their reintroduction (1972-2000). Wildlife Society Bulletin 30(2):575-584.

Zimmermann, B., P. Wabakken, and M. Dötterer. 2001. Human-carnivore interactions in Norway: How does the re-appearance of large carnivores affect people's attitudes and levels of fear? Forest, Snow, and Landscape Research 76(1/2):137-153.

Zinn, H. C., and C. L. Pierce. 2002. Values, gender, and concern about potentially dangerous wildlife. Environment and Behavior 34(2): 239-256.

APPENDIX A:

Table A1. Frequencies for variables expected to influence attitude measures for longtime residents from 2006 Westchester County and 2007 Saratoga County telephone surveys.

	Dependent Variables					
	Pleased coyotes live in area (n = 625)		Value coyote presence (n = 589)		Concerned about coyotes (n = 646)	
Independent Variables	Agree	Disagree	Agree	Disagree	Agree	Disagree
Mean neutral experience score[a*]	1.93	1.51	1.80	1.63	1.55	1.93
Mean negative experience score[b*]	0.28	0.30	0.27	0.34	0.33	0.20
Mean age (years)[*]	52.0	58.5	53.1	59.6	56.3	57.1
	%	%	%	%	%	%
Duration of coyote presence[c]						
long (Saratoga Co.)	15.5	28.6	25.6	18.3	30.0	13.5
short (Westchester Co.)	15.2	40.6	29.4	26.7	42.9	13.6
Gender						
male	15.1	23.4	21.8	17.2	25.4	12.2
female	15.7	45.8	33.2	27.9	47.6	14.7
Hunting	31.8	68.2	51.1	48.9	66.7	33.3
Cat in household	47.2	52.8	69.4	30.6	72.8	27.2
Dog in household	33.8	66.2	61.1	38.9	74.2	25.8
Education level						
less than high school	0.3	1.5	0.9	0.9	1.6	0.2
completed high school/GED	5.6	15.0	9.2	10.8	14.4	6.2
vocational or trade school	0.8	1.1	1.2	0.7	0.9	1.1
some college/two-yr. degree	5.9	16.7	13.4	9.9	16.7	6.4
bachelors or graduate degree	18.1	34.8	30.5	22.8	39.4	13.1
Area where respondent lives						
town or city	3.5	10.3	7.0	6.5	9.5	4.3
suburb	17.0	41.5	31.3	27.0	43.7	14.9
rural	10.3	17.5	16.8	11.4	19.7	7.9
Feed birds	36.8	63.2	60.9	39.1	70.1	29.9
Child in household	32.1	67.9	67.5	32.5	72.6	27.4
Curb garbage	32.1	67.8	58.7	41.3	72.0	28.1
Feed pets outdoors	35.3	64.7	59.4	40.6	72.9	27.1

[*]Represented as mean value of independent variable for each response to dependent variable.
[a]Scale 0-5 depicts amount of neutral experience for each respondent based on responses to questions about observations of coyotes.
[b]Scale 0-3 depicts amount of negative experience for each respondent based on responses to questions about problems with coyotes.
[c]Long duration of coyote presence is >60 years and short duration of coyote presence is ≈ 20 years.

Table A2. Frequencies for variables expected to influence risk perception measures for longtime residents from 2006 Westchester County and 2007 Saratoga County telephone surveys.

	Dependent Variables							
	Likelihood of injury to pet acceptably low (n = 581)		Likelihood of injury to person acceptably low (n = 606)		Concern about threat to pet (n = 655)		Concern about threat to young child (n = 652)	
Independent Variables	Agree	Dis.	Agree	Dis.	Agree	Dis.	Agree	Dis.
Mean neutral experience score[*a]	1.35	2.04	1.66	1.76	1.77	1.05	1.64	1.77
Mean negative experience score[*b]	0.16	0.46	0.27	0.38	0.34	0.07	0.30	0.29
Mean age (years)[*]	55.1	57.4	56.0	57.2	56.8	55.7	57.0	54.8
	%	%	%	%	%	%	%	%
Duration of coyote presence[c]								
long (Saratoga Co.)	22.4	21.9	34.3	10.9	35.9	7.8	33.0	10.9
short (Westchester Co.)	23.9	31.8	39.9	14.9	48.2	8.1	48.0	8.1
Gender								
male	21.4	17.8	30.6	8.1	30.6	7.3	29.2	8.6
female	25.0	35.9	43.6	17.7	53.5	8.6	51.9	10.3
Hunting	48.8	51.2	65.1	34.9	75.6	24.4	64.4	35.6
Cat in household	44.4	55.6	83.0	17.0	87.9	12.1	72.8	27.2
Dog in household	46.9	53.1	74.3	25.7	87.4	12.6	80.3	19.7
Education level								
less than high school	0.3	1.4	0.8	0.8	1.7	0.0	1.5	0.2
completed high school/GED	9.7	11.1	15.8	5.8	17.5	3.4	17.9	3.1
vocational or trade school	1.2	1.0	1.8	0.3	1.5	0.5	1.4	0.6
some college/two-yr. degree	10.9	13.2	18.1	5.2	19.7	3.6	19.4	4.3
bachelors or graduate degree	24.5	26.5	37.8	13.5	43.7	8.3	40.6	11.0
Area where respondent lives								
town or city	6.6	7.1	9.9	3.8	11.5	2.3	11.4	2.6
suburb	27.2	30.3	43.6	14.5	48.6	9.9	47.8	10.4
rural	12.6	16.2	20.8	7.3	24.0	3.7	21.8	6.0
Feed birds	47.1	52.9	74.6	24.5	85.8	14.2	79.2	20.8
Child in household	59.5	40.5	82.9	17.1	79.1	20.9	87.1	12.9
Curb garbage	46.5	53.5	74.0	26.0	81.7	18.2	80.2	19.8
Feed pets outdoors	41.8	58.2	78.3	21.7	84.7	15.3	73.6	26.4

[*]Represented as mean value of independent variable for each response to dependent variable.
[a]Scale 0-5 depicts amount of neutral experience for each respondent based on responses to questions about observations of coyotes.
[b]Scale 0-3 depicts amount of negative experience for each respondent based on responses to questions about problems with coyotes.
[c]Long duration of coyote presence is >60 years and short duration of coyote presence is ≈ 20 years.

Table A3. Frequencies for variables expected to influence attitude measures for newcomer and longtimer residents from 2007 Saratoga County telephone survey.

	Dependent Variables					
	Pleased coyotes live in area (n = 524)		Value coyote presence (n = 500)		Concerned about coyotes (n = 526)	
Independent Variables	Agree	Disagree	Agree	Disagree	Agree	Disagree
Mean neutral experience score[a*]	1.45	1.17	1.33	1.29	1.22	1.51
Mean negative experience score[b*]	0.18	0.26	0.18	0.32	0.26	0.14
Mean age (years)[*]	49.4	52.9	48.7	55.8	51.7	51.5
	%	%	%	%	%	%
Tenure of residence[c]						
newcomer	16.5	30.7	30.3	17.7	34.7	11.6
longtimer	18.6	34.3	30.3	21.7	37.0	16.6
Gender						
male	16.1	23.1	24.0	15.8	26.1	13.3
female	19.3	41.5	36.7	23.4	45.9	14.7
Hunting	34.5	65.5	50.0	50.0	71.2	28.8
Cat in household	41.8	58.2	68.3	31.7	72.7	27.3
Dog in household	38.8	61.2	69.6	30.4	73.5	26.5
Education level						
less than high school	1.0	2.3	1.6	1.4	2.7	0.6
completed high school/GED	7.1	13.2	10.4	9.6	14.5	5.9
vocational or trade school	0.4	0.8	0.8	0.4	0.8	0.6
some college/two-yr. degree	7.2	16.6	14.0	9.8	17.4	6.7
bachelors or graduate degree	19.7	31.8	34.0	17.8	36.8	14.3
Area where respondent lives						
town or city	6.1	9.9	9.4	6.6	10.7	5.7
suburb	18.7	36.1	34.3	20.6	40.4	14.7
rural	10.3	18.7	17.0	12.0	21.0	7.6
Feed birds	37.0	63.0	61.4	38.6	69.6	30.4
Child in household	43.7	56.3	72.3	27.7	71.2	28.8
Curb garbage	34.7	65.3	61.3	38.7	70.6	29.4
Feed pets outdoors	29.2	70.8	55.2	44.8	71.1	28.9

[*]Represented as mean value of independent variable for each response to dependent variable.
[a]Scale 0-5 depicts amount of neutral experience for each respondent based on responses to questions about observations of coyotes.
[b]Scale 0-3 depicts amount of negative experience for each respondent based on responses to questions about problems with coyotes.
[c]Saratoga Co. resident sample was divided into newcomers (living in county ≤ 5 years) and longtimers (living in county ≥ 21years).

Table A4. Frequencies for variables expected to influence risk perception measures for newcomer and longtimer residents from 2007 Saratoga County telephone survey.

	Dependent Variables							
	Likelihood of injury to pet acceptably low (n = 490)		Likelihood of injury to person acceptably low (n = 514)		Concern about threat to pet (n = 537)		Concern about threat to young child (n = 537)	
Independent Variables	Agree	Dis.	Agree	Dis.	Agree	Dis.	Agree	Dis.
Mean neutral experience score[*a]	1.06	1.57	1.28	1.41	1.38	0.86	1.23	1.46
Mean negative experience score[*b]	0.13	0.35	0.20	0.32	0.25	0.08	0.22	0.22
Mean age (years)[*]	50.9	52.1	51.1	53.3	52.2	50.0	52.1	50.9
	%	%	%	%	%	%	%	%
Tenure of residence[c]								
newcomer	26.2	21.1	34.8	11.7	38.9	7.7	37.4	9.2
longtimer	26.6	26.0	40.6	12.9	43.9	9.5	40.2	13.3
Gender								
male	24.7	16.2	31.6	8.2	30.2	9.3	28.9	10.6
female	28.2	30.9	43.7	16.6	52.6	7.8	48.9	11.6
Hunting	53.6	46.4	75.4	24.6	76.3	23.7	61.0	39.0
Cat in household	50.9	49.1	83.0	17.0	81.7	18.3	69.6	30.4
Dog in household	52.5	47.5	75.4	24.6	81.3	18.8	74.5	25.5
Education level								
less than high school	0.6	2.5	1.6	1.4	3.0	0.2	3.0	0.2
completed high school/GED	10.2	10.6	15.6	5.5	17.2	3.5	17.5	3.2
vocational or trade school	0.6	0.8	1.0	0.4	1.1	0.2	0.9	0.4
some college/two-yr. degree	12.2	11.8	17.8	5.6	19.6	4.5	18.7	5.4
bachelors or graduate degree	29.2	21.3	39.3	11.9	42.0	8.7	37.5	13.3
Area where respondent lives								
town or city	9.2	7.2	12.1	3.9	13.2	3.0	13.1	3.2
suburb	30.5	24.1	41.5	13.3	44.2	10.8	41.0	14.0
rural	13.1	16.0	21.8	7.4	25.4	3.4	23.5	5.2
Feed birds	51.8	48.2	74.3	25.7	82.1	17.9	76.3	23.7
Child in household	63.6	36.4	85.7	14.3	79.2	20.8	82.1	17.9
Curb garbage	50.9	49.1	75.1	24.9	82.3	17.7	77.0	23.0
Feed pets outdoors	49.3	50.6	72.0	28.0	77.9	22.1	79.2	20.8

[*]Represented as mean value of independent variable for each response to dependent variable.
[a]Scale 0-5 depicts amount of neutral experience for each respondent based on responses to questions about observations of coyotes.
[b]Scale 0-3 depicts amount of negative experience for each respondent based on responses to questions about problems with coyotes.
[c]Saratoga Co. resident sample was divided into newcomers (living in county ≤ 5 years) and longtimers (living in county ≥ 21years).