



Examensarbete i ämnet biologi

Attitudes toward brown bears (*Ursus arctos*) in Sweden

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30 Poäng, D-nivå



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Attityder mot björn (*Ursus arctos*) i Sverige

Sammanfattning

Den svenska björnpopulationen har vuxit från några få djur till minst 2500 individer under de senaste 80 åren, med en ganska konstant tillväxt kring 1.5 % per år. Jag ville se vilka attityder som formats kring björnar i Sverige nu när björnarnas habitat närmar sig stadsregionerna och det blir vanligare att hitta spår av björn i naturen. En enkät skickades ut över hela landet 2004, vid den tidpunkten hade inga människor dödats av björn på 102 år, och datat analyserades av mig hösten 2007. Jag visar att de flesta svenskar har positiva attityder till björnar, trots att nästan hälften av respondenterna är rädda för att möta en björn. Stadsboende människor har mest positiva attityder, men är också de som hyser störst rädsla för björnarna. När jag jämförde med studier från andra europeiska länder visade sig svenskarna ha mindre positiva attityder än människor bosatta i södra Europa. En stor andel av variationen bland attityder mot björn är fortfarande inte klarlagd, vilket förmodligen beror på att den undersökning jag arbetade med blivit utarbetad utifrån erfarenheter med attityder till varg, och attityder till björn bildas på andra grunder. Min slutsats är att framtida undersökningar bör fokusera på att undersöka andra aspekter kring hur attityder till björn formas för att man skall kunna få en fullständig förståelse för detta.

Attitudes toward brown bears (*Ursus arctos*) in Sweden

Abstract

The Swedish brown bear population has grown from very few animals to at least 2500 individuals in about 80 years time, with a rather constant growth of 1.5 % per year. I wanted to see what the attitudes towards bears are like in Sweden now when the bears expand their habitats closer to urban areas and it is getting more common to encounter bears or tracks from bears in nature. A national mail survey was made in 2004, when no human deaths related to bears had occurred for 102 years, and data was analysed from that survey. I show that most Swedes hold positive attitudes toward bears, despite almost half of the respondents being afraid of encounters with bears. Urbanites are the ones with the most positive attitudes, but also the ones who fear bears the most. When compared to studies from other European countries Swedes are less positive towards bears than people from southern Europe. A large portion of the variation in why people hold their attitudes toward bears remains unexplained, which is most likely due to this survey being designed with previous experiences from wolves in mind and attitudes toward bears are not formed on the same grounds. My conclusion was that future surveys need to focus on examining other aspects to how attitudes toward bears are formed in order to gain a full understanding of this.

Introduction

In the mid 19th century there were around 5000 brown bears (*Ursus arctos*) on the Scandinavian Peninsula. Most of these populated Norway. Around 1930 the bear population was down to around 130 individuals in Sweden due to extensive hunting, with bears in Norway being extinct. At this time bears in Sweden were protected for a while so the population could recover. In 1943 hunting was allowed once again in Sweden and since then about 5% of the bears have been killed by hunters each year, allowing the population to increase steadily at about 1.5% per year (Swenson et al, 1998). Today the Swedish brown bear population consists of at least 2500 individuals in four core areas, while the Norwegian population is still close to local extinction with a population of about 17 individuals. As a consequence of the return of the brown bear to populated areas in Sweden, people encounters with bears become more frequent – even close to urban areas (Hagerman 2000). This gives rise to a range of emotions and attitudes among the public toward bears.

On a national scale Swedes display positive attitudes toward bears (Sahlén et al. 2006). Surveys in local communities where bears are present and numerous can however show a majority of negative attitudes (ibid). There have been very few surveys performed about the attitudes toward bears in Sweden, as the main focus is on the wolves who have become a flag species of sorts to represent the attitudes toward all the predators in Sweden. There have been several surveys performed on the attitudes toward wolves in Sweden (e.g. Ericsson & Heberlein 2003, Heberlein & Ericsson 2005), and the experience from these surveys was used when designing the survey that has been analyzed here.

Current research from European countries suggests that a majority of people have positive attitudes toward brown bears. Southern European attitudes seem to be even more positive than those in the north of Europe. Greater knowledge about predators, declining population trends and financial incentives – for example increased tourism – has a positive effect on the attitudes towards bears. The factors that give a negative effect on the attitudes towards bears are old age, rural residence but also financial incentives – for example livestock being killed. Fear of bears is an important factor for attitudes toward bears in Slovenia, but in Croatia it was shown that fear had no effect on attitudes toward bears. Experience with predation and direct experiences with bears has effects on both levels of fear and attitudes toward bears (Majić 2003, Andersone & Ozolins 2004, Kaczensky 2004, Randveer 2006).

The behaviour of brown bears has to a great extent been formed by interaction between humans and bears (Swenson 1999). Throughout history, where there have been conflicts with humans, the brown bear has been hunted and killed. The killing of bears has functioned as a genetic selection where bears with “human friendly” characteristics have had a better survival rate in populated areas (Swenson 1999). European bears whose ancestors have interacted with society for a very long time are more shy of people and usually eat less meat (Dahle et al. 1998, Swenson 1999, Saarma et al. 2007). Swedish bears which almost suffered extinction and also have been subjected to hunters for a long time have been described as the friendliest brown bears in the world (Swenson et al. 1999, Sahlén et al. 2006). When the survey from which my data originates was performed, there had not been any human fatalities caused by brown bears for 102 years in Sweden (Swenson et al. 1999).

Because of these previous studies, we may assume that the attitudes toward brown bears are rather positive in Sweden.

The purpose of this paper is to identify and study the attitudes toward brown bears of people living in Sweden. I specifically address social and demographic variables to see if any patterns can be found, such as differences of origin, residence and degree of knowledge. My predictions derived from the literature review above is that attitudes toward bears

- 1) are more positive in Sweden than they are in other countries
- 2) show similar patterns as attitudes toward wolves, where increased knowledge and direct experiences with wolf predation has a negative effect on attitudes (Ericsson & Heberlein 2003).

Methods

A national mail survey was sent out where municipalities close to carnivore populations was oversampled. The area defined as having carnivore populations were the six northern counties (Norrbotten, Västerbotten, Jämtland, Västernorrland, Gävleborg and Dalarna). To each of the municipalities within these counties 150 questionnaires were sent out to a random sample of people (a total of 10350 questionnaires). To get a national representation, 1067 questionnaires were also sent out to a random sample of Swedes living south of the defined area with carnivore populations (Ericsson et al. 2008).

A mail survey was used instead of a telephone survey to reduce the potential bias of people giving socially acceptable answers rather than their own opinions (Dillman 2000). The random samples were limited to people of age 16 to 65 and were drawn from the official, national and continuously updated register of all Swedish citizens. The survey was mailed during March 2004 with an overall response rate of 65%. Response rate was significantly higher from carnivore areas (Dalarna 66%, Gävleborg 68%, Jämtland 65%, Västernorrland 71%, Västerbotten 66%, Norrbotten 63%) as compared to the national sample (Rest of Sweden 57%). The total number of questionnaires used in the processing of data was 6612, since some of the respondents did not answer the parts of the questionnaire that had to do with brown bears.

The percentages were weighted according to residence of the respondent and population size in that area, to get a representative national sample. The same weights were applied for experience items when relevant. When attitude and path analysis were performed, no weighting was done as the models analysed the casual relationships.

Eight survey items was summed up to form a sum score of attitudes toward bears with a scale from 0 to 37. Six survey items were summed to form a sum score of knowledge about predators with a scale from 0 to 6. Respondents who said they had been hunting at least once in the last five years was classified as being a hunter (1=yes, 0=no). The following variables was measured on a scale from 0 to 1; foreign origin, urban origin, parents of urban origin, parents of rural origin, hunter, fishing household, fear. The following variables were measured on a scale from 0 to 2; found tracks, seen bears, found remains, had domestic animals killed. Knowledge was measured on a scale from 0 to 6. Attitude was measured on a scale from 0 to 37. Age was represented as year of birth, i.e. 1914 to 1989.

Exploratory path analysis was used to find out which of the survey items showed an effect on attitudes toward bears. That means only a few parameters at a time were added to the path analysis and if they did not show statistical significance they were discarded. Since the previous surveys on attitudes toward wolves have shown that age and knowledge has an effect on attitudes, those were the first items that were fitted in the model. In the path analyses, each relation signifies the effect of one variable on the other. The parameter (r) is not a standard regression coefficient with the absolute value of 1. Since the maximum value of "Attitudes" is 37, any relation that connects to "Attitudes" has the absolute value of 37.

In the same way, any relation that connects to "Knowledge" has the absolute value of 6 while most others have the absolute value of 1.

Indexes were used to describe the model as well. Goodness of fit index and adjusted goodness of fit index is similar to multiple r squared in standard multiple regression where 1 equals perfect fit. Bentler-Bonnett NFI describes how many of the possible relationships were included in the model where 1 equals all possible relationships. Usually the Bentler-Bonnett NFI was lower than 1 because the relationships without statistical significance ($P > 0.05$) were omitted but also because some relationships were considered irrelevant in this context. SRMR is Standardized Root Mean Squared Residual and should be lower than 0.10 to represent good fit.

The R statistical package was used for processing the data (R Development Core Team 2008). To handle computations of Cronbach's alpha for reliability tests, the psy package was added to the basic R packages (Falissard 2008). The sem package was also added to the R setup to provide functionality for path analysis (Fox 2006).

Results

Fear of bears was a lot higher (48 %) in the major cities than in the rural communities (36 %). Still, more people in the major cities favoured having bears in Sweden and where they live themselves than people in the countryside did. More people living in the countryside were neutral towards bears (table 1; items C and E) than people living in major cities (about 10 % difference). It would also seem that the bear has a higher symbolic value to people in major cities than it does for people in the countryside (table 1; item F). Most respondents were satisfied with the government goals for the Swedish brown bear population and didn't want the goal to change (table 1; item H).

When combined, the attitude items from Table 1 (excluding fear) gave a Chronbach's alpha value of 0.91 (from 6612 eligible respondents). This indicates that they are highly correlated. To get each variables correlation to the others I did a zero-order correlation (Table 2) which showed a high correlation among all of the attitude items. The lowest correlation to the other attitude items can be seen for attitude item B; "Would you accept having bears where you live" and H; "What do you think of the government goal of having 1000 bears in Sweden".

Factor analysis (using maximum likelihood estimation) was performed to test the consistency of the attitude items and produced a one factor solution (p , df , Chi square). Test of the hypothesis that one factor was sufficient gave a chi square statistic of 1159 on 20 degrees of freedom ($p < 0.00001$). All factor loadings are very similar, proving the attitude items have a common factor. The high correlation (0.45 – 0.71) and high value on Cronbach's alpha ($\alpha = 0.91$) coupled with the high factor loadings for all variables (0.67 – 0.84) showed that the attitude items have a common structure (table 3). Thus, the sum of the attitude items could be used to confidently describe the attitude of each respondent toward bears.

Table 1: Fear of animals and attitude items toward bears among the respondents. The attitude items have been labelled A – H. Metrics of each question in brackets. Residence is divided by community size, from rural communities of < 200 inhabitants to Stockholm, Gothenburg and Malmoe which are the largest cities in Sweden.

Attitude item		Residence					
		Total	< 200	< 2000	< 10k	< 180k	S, G, M
Respondents		7845	1538	918	1535	1074	158
Weighted respondents		5796	622	522	1069	2207	1274
Are there any wild animals you would fear to face in nature?	None	35 %	37 %	35 %	34 %	36 %	35 %
	Moose	13 %	14 %	11 %	15 %	11 %	13 %
	Roe deer	2 %	2 %	2 %	3 %	1 %	2 %
	Bear	44 %	36 %	41 %	43 %	44 %	48 %
	Snake	31 %	30 %	19 %	35 %	32 %	33 %
	Lynx	13 %	7 %	4 %	18 %	13 %	14 %
	Wolf	25 %	15 %	25 %	29 %	23 %	29 %
	Wild boar	29 %	25 %	19 %	33 %	30 %	30 %
	Wolverine	9 %	7 %	13 %	9 %	11 %	10 %
A. What do you think about having bears in Sweden (1 - 5)	Positive	76 %	70 %	73 %	74 %	78 %	79 %
	Negative	6 %	10 %	8 %	3 %	5 %	6 %
B. Would you accept having bears where you live? (1 - 4)	Positive	59 %	56 %	59 %	58 %	61 %	62 %
	Negative	38 %	43 %	40 %	41 %	36 %	37 %
C. How important are bears to you personally? (1 - 7)	Positive	50 %	42 %	56 %	48 %	51 %	54 %
	Negative	17 %	17 %	21 %	13 %	17 %	16 %
D. I may never see a wild bear, but it is important to me that they exist in Sweden (1 - 4)	Positive	87 %	87 %	84 %	91 %	90 %	86 %
	Negative	11 %	12 %	16 %	7 %	9 %	13 %
E. Overall I care a lot about bears (1 - 4)	Positive	63 %	70 %	62 %	57 %	66 %	63 %
	Negative	35 %	30 %	36 %	41 %	34 %	35 %
F. To me bears symbolize nature's beauty and grandeur (1 - 4)	Positive	84 %	81 %	87 %	81 %	86 %	85 %
	Negative	14 %	19 %	11 %	18 %	13 %	13 %
G. I think it would be a great experience to see a bear in the wild (1 - 4)	Positive	85 %	83 %	84 %	84 %	89 %	84 %
	Negative	13 %	17 %	16 %	15 %	11 %	14 %
H. What do you think of the government goal of having 1000 bears in Sweden? (1 - 5)	Increase	21 %	16 %	27 %	23 %	21 %	22 %
	Decrease	13 %	25 %	21 %	14 %	11 %	9 %

There were six true/false/unsure questions in the survey that measured knowledge about predators. Four questions were about the biology of wolverine, lynx, wolf and bear respectively. The other two questions were "It is allowed to hunt bears, wolverines, lynx and wolves in Sweden" and "Hunters shoot more moose than predators kill". The correct answer was given a score of one for each of the six questions and the other alternatives scored zero. The score for the six knowledge items was summed up to create a measure of each respondent's knowledge. Cronbach's alpha of the six items was 0.94 and factor analysis showed that one factor was sufficient (chi square = 303.7 on 9 degrees of freedom, $p < 0.0001$), indicating that knowledge could be used as a factor as well.

Table 2: Zero-order correlation among attitude items from Table 1.

Variable	A	B	C	D	E	F	G
B	.62						
C	.71	.59					
D	.62	.45	.58				
E	.60	.49	.65	.56			
F	.61	.45	.61	.60	.65		
G	.62	.53	.57	.59	.55	.62	
H	.63	.48	.57	.50	.51	.49	.47

Table 3: Factor analysis of the eight attitude items show high consistency.

Attitude item	Factor loading	Uniqueness
A. What do you think about having bears in Sweden	0.84	0.30
B. Would you accept having bears where you live?	0.67	0.55
C. How important are bears to you personally?	0.81	0.34
D. I may never see a wild bear, but it is important to me that they exist in Sweden	0.74	0.46
E. Overall I care a lot about bears	0.76	0.42
F. To me bears symbolize nature's beauty and grandeur	0.77	0.40
G. I think it would be a great experience to see a bear in the wild	0.74	0.45
H. What do you think of the government goal of having 1000 bears in Sweden?	0.69	0.53

As shown by Figure 1, most of the respondents had a high knowledge score about Swedish predators. About 24% of these respondents were hunters (1467 respondents).

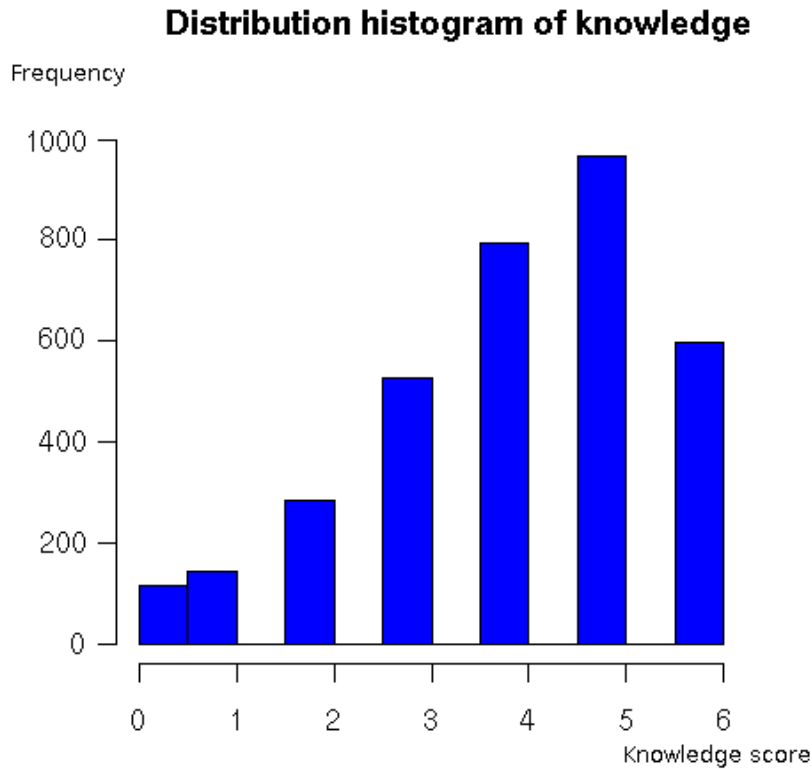


Figure 1: Distribution of knowledge score among the respondents.

Age was represented as year of birth, so the path analysis in figure 2 shows that younger people have a slightly more positive attitude towards bears than older people ($r = 0.002$). This means a respondent aged 70 had an attitude score 0.1 units lower than a respondent aged 20: thus, a rather small effect. Knowledge about predators was far more important than age ($r = 0.720$). A respondent with a knowledge score of 6 had an attitude score 4.32 units higher than a respondent with a knowledge score of 0. Being a hunter had a negative effect on the attitudes toward bears ($r = -0.950$), but also had an indirect effect by influencing the knowledge score by about 16% ($r = 0.966$, knowledge score maximum = 6).

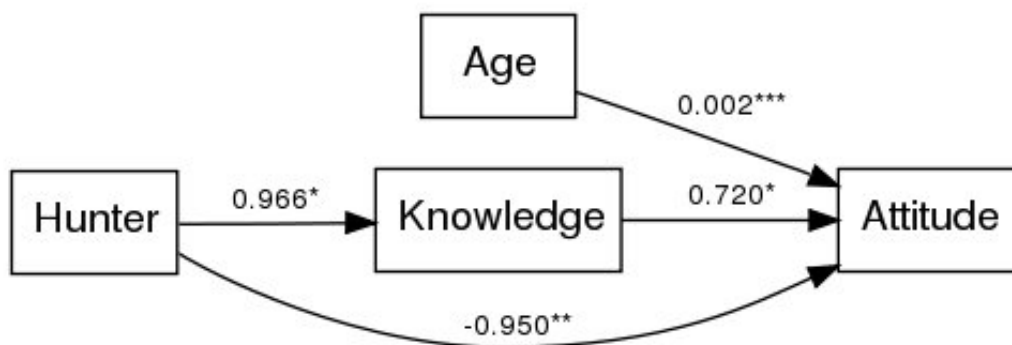


Figure 2: The effect of knowledge and age on attitude towards bears, and the effect of being a hunter on knowledge about predators and attitude. Goodness of fit index (GFI) was 1. Adjusted goodness of fit index (AGFI) was 1. Bentler-Bonnett NFI was 0.999. SRMR was 0.003.
 **** P = 0, *** P < 0.0001, ** P < 0.001, * P < 0.05.

There was data for each respondent on their current residence, but according to path analysis residence did not have any statistically significant influence on attitude towards bears. It was evident from path analysis (figure 3) that having an urban origin had a significant effect on attitudes toward bears ($r = 1.438$), while the effect of having a foreign origin was slightly less ($r = 1.040$).

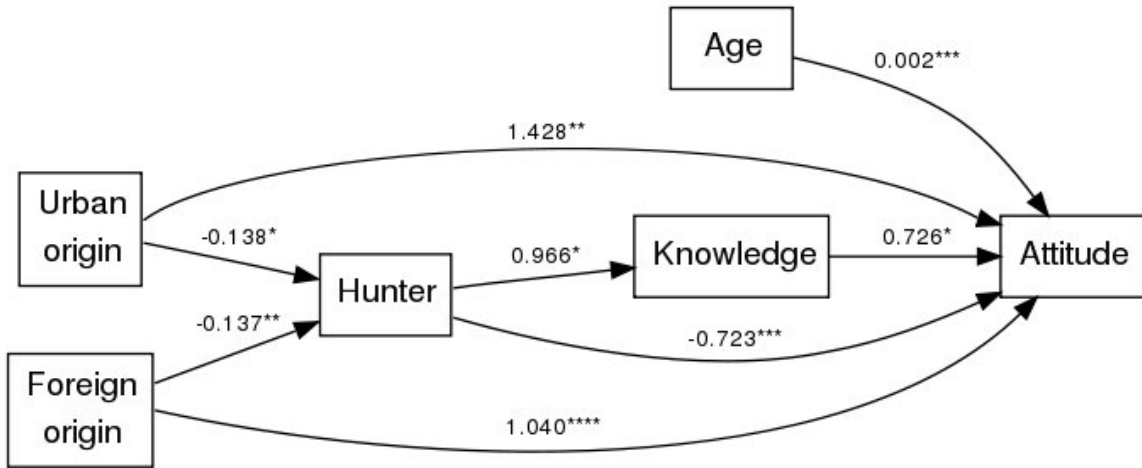


Figure 3: Effect of urban (city of more than 10'000 citizens) or foreign origin (where they lived for the most part up until 18 years of age), age, knowledge about predators and being a hunter on attitudes toward bears. GFI was 0.999. AGFI was 0.998. Bentler-Bonnett NFI was 0.983. SRMR was 0.010. **** $P = 0$, *** $P < 0.0001$, ** $P < 0.001$, * $P < 0.05$

As can be seen from Figure 4-6, there was a clear difference of knowledge between hunters and non-hunters, but not so clear difference of knowledge between people of rural or urban origin. When it comes to attitude, there was a much more obvious pattern between rural or urban origin, and not much difference at all between hunters and non-hunters.

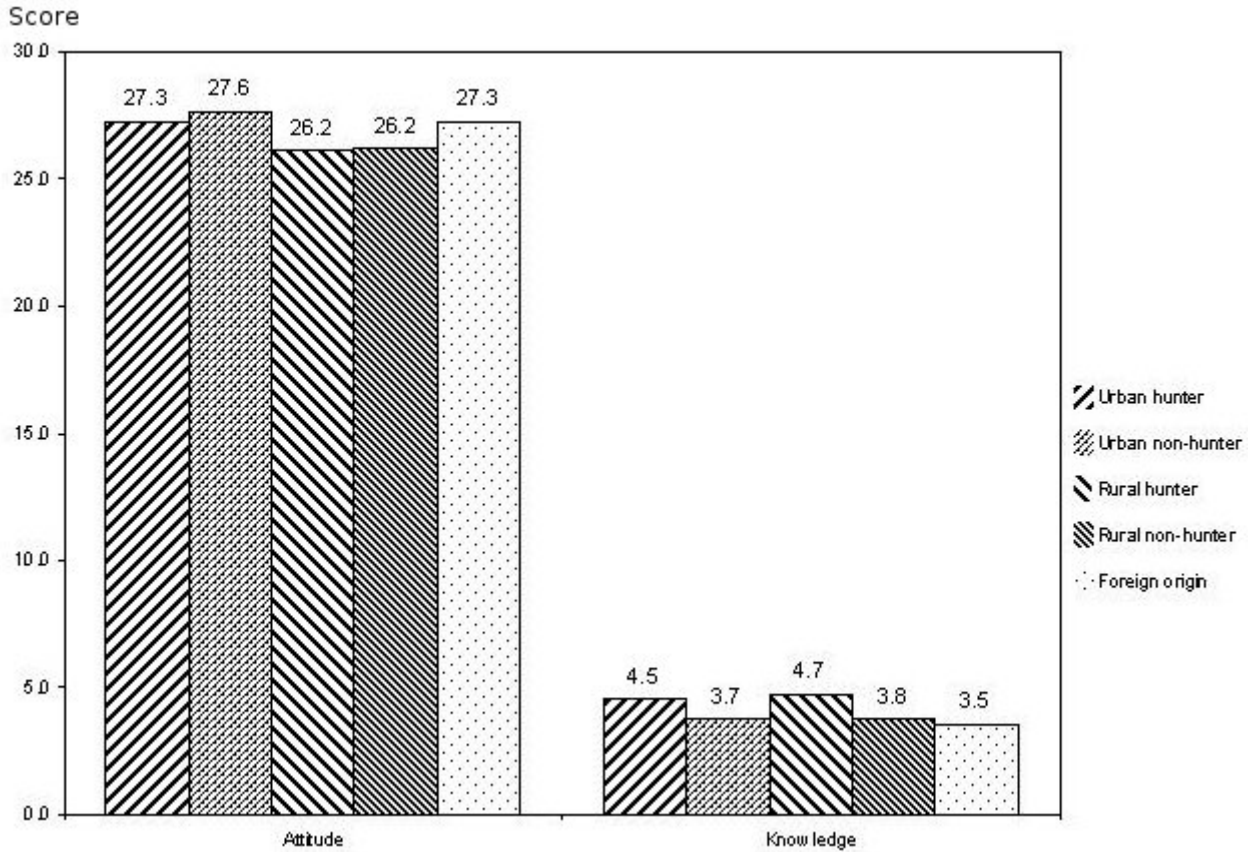


Figure 4: Distribution of knowledge among hunters and non-hunters of rural/urban origin. Respondents of foreign origin were not divided into hunters/non-hunters due to the small sample size. The maximum possible attitude score was 37 and the maximum possible knowledge score was 6.

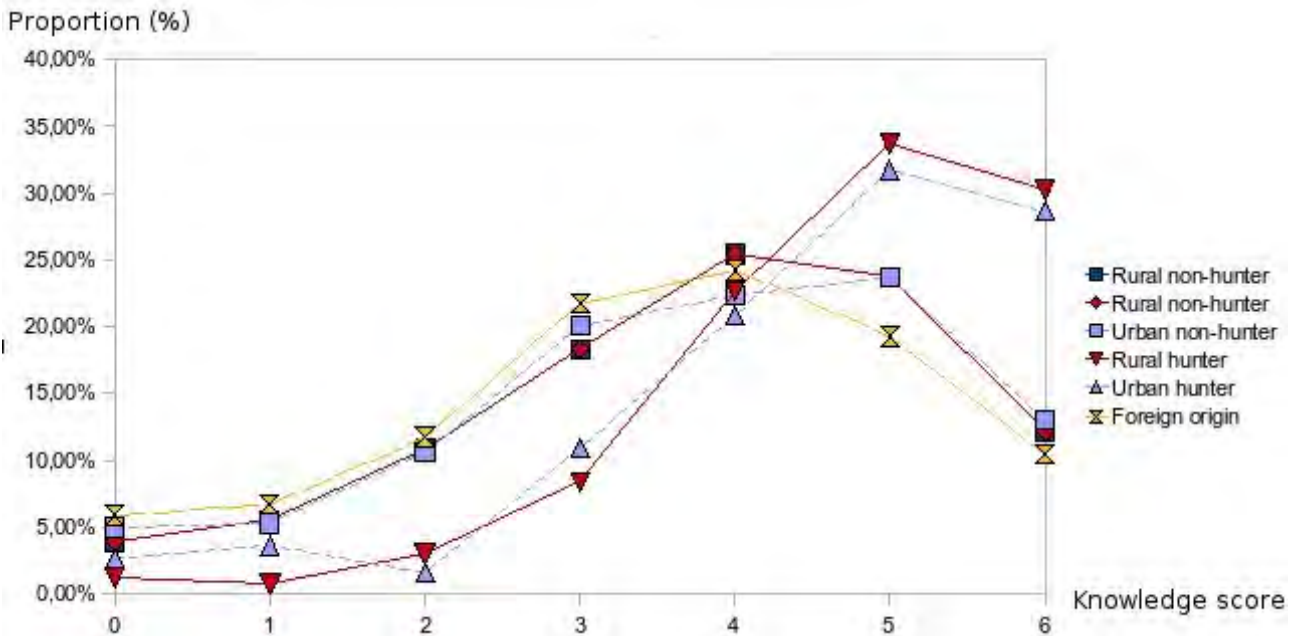


Figure 5: Knowledge about predators for hunters and non hunters of rural or urban origin (where they spent the majority of their lives before 18 years of age). Respondents with a foreign origin were not separated into hunters/non-hunters.

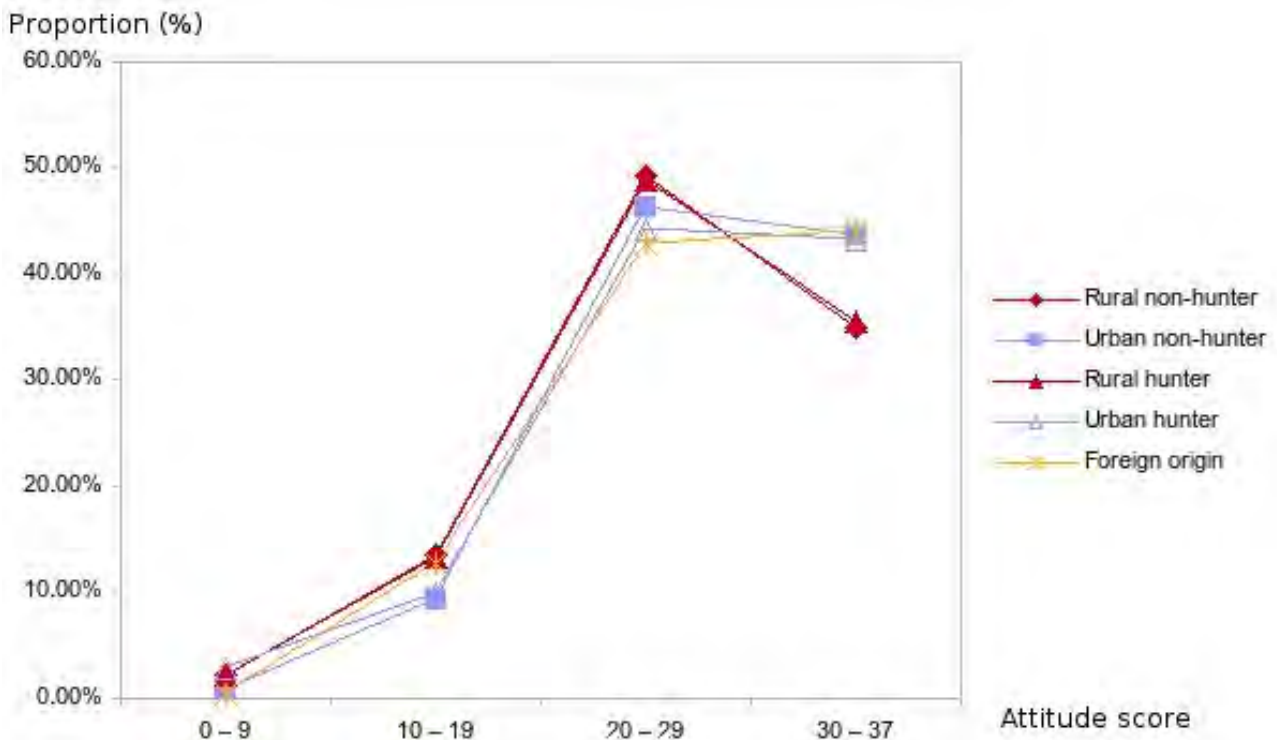


Figure 6: Attitudes toward bears for hunters and non hunters of rural or urban origin (where they spent the majority of their lives before 18 years of age). Respondents of foreign origin were not classified as hunters or non-hunters.

The average attitude score was quite similar between the groups, as can be seen in Figure 6. Since the maximum possible attitude sum was 37 all of the averages were 8-9 units above the middle of the scale (or at about 70% of maximum). Respondents with a rural origin was slightly more knowledgeable on average than those of rural origin, but hunters were the most knowledgeable of all by almost a whole units difference (maximum score 6). Respondents with a foreign origin were the least knowledgeable on average.

It seems a very high proportion of the respondents living in major cities had seen bear tracks and wild bears (Table 4). In fact, the difference between the urban and rural respondents was very small until positive experiences was compared with negative experiences, such as having a domestic animal killed or finding remains of a killed animal.

Table 4: Experience with bears or bear-related damages among the respondents.

Experience item		Residence					S, G, M
		Total	< 200	< 2000	< 10k	< 180k	
How many times have you seen bear tracks?	> 1	13 %	19 %	17 %	13 %	11 %	12 %
	1	13 %	10 %	8 %	10 %	18 %	12 %
	0	71 %	69 %	71 %	76 %	70 %	73 %
How many times have you seen a bear in the wild?	> 1	5 %	8 %	8 %	7 %	3 %	5 %
	1	9 %	9 %	4 %	7 %	11 %	8 %
	0	84 %	82 %	86 %	85 %	86 %	87 %
How many times has a predator (bear, lynx, wolf or wolverine) killed one of your domestic animals?	> 1	0 %	1 %	0 %	0 %	1 %	NA
	1	1 %	6 %	0 %	2 %	0 %	1 %
	0	97 %	93 %	99 %	97 %	99 %	97 %
How many times have you found remains of animals killed by a predator (bear, lynx, wolf or wolverine)?	> 1	8 %	16 %	13 %	8 %	7 %	2 %
	1	10 %	12 %	17 %	7 %	11 %	6 %
	0	81 %	72 %	70 %	84 %	82 %	90 %

As can be seen in figure 7, it was very likely that a respondent who has found remains of animals killed by predators was a hunter ($r = 0.905$). It was also very likely that a respondent who has found tracks was a hunter ($r = 0.808$). However, there was a very small likelihood that a respondent who has had their domestic animals killed was a hunter ($r = 0.090$). Experience items was measured on a scale from 0 to 2 where 0 = never, 1 = once and 2 = more than once. This means having a domestic animal killed by a predator had a very large effect on attitudes toward bears ($r = -2.157$ means maximum effect was -4.314 units or -11.6 %).

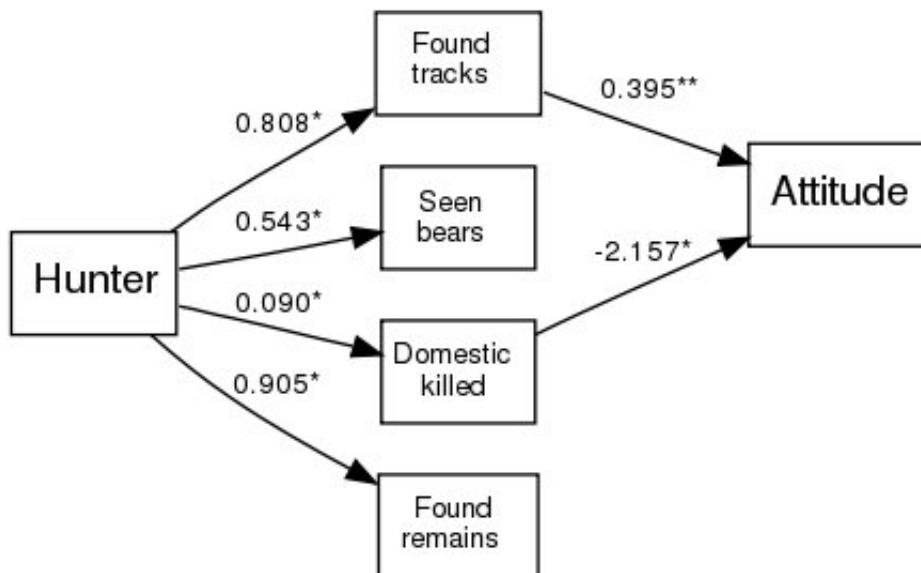


Figure 7: Hunters experience with bears (tracks and encounters) and predators in general (own animals killed and remains found). GFI was 0.869. AGFI was 0.694. Bentler-Bonnett NFI was 0.545. SRMR was 0.127. **** P = 0, *** P < 0.0001, ** P < 0.001, * P < 0.05

In relation to fear, tested in figure 8, the effect of knowledge ($r = 0.565 * 6$) was also less than the effect from fear of bears ($r = -4.513 * 1$). Urban people are more often afraid of bears than rural people (table 1), but in spite of this having an urban origin had a positive effect on the attitude towards bears ($r = 1.419$).

When combining the different variables in the path analysis, it was clear that fear had the greatest effect on attitudes toward bears ($r = -4.513$). Being a hunter was the most important factor in the reduction of fear ($r = -0.209$) followed by knowledge about predators ($r = -0.028$). The variable with the most positive effect on attitudes toward bears was knowledge about predators ($r = 0.565$).

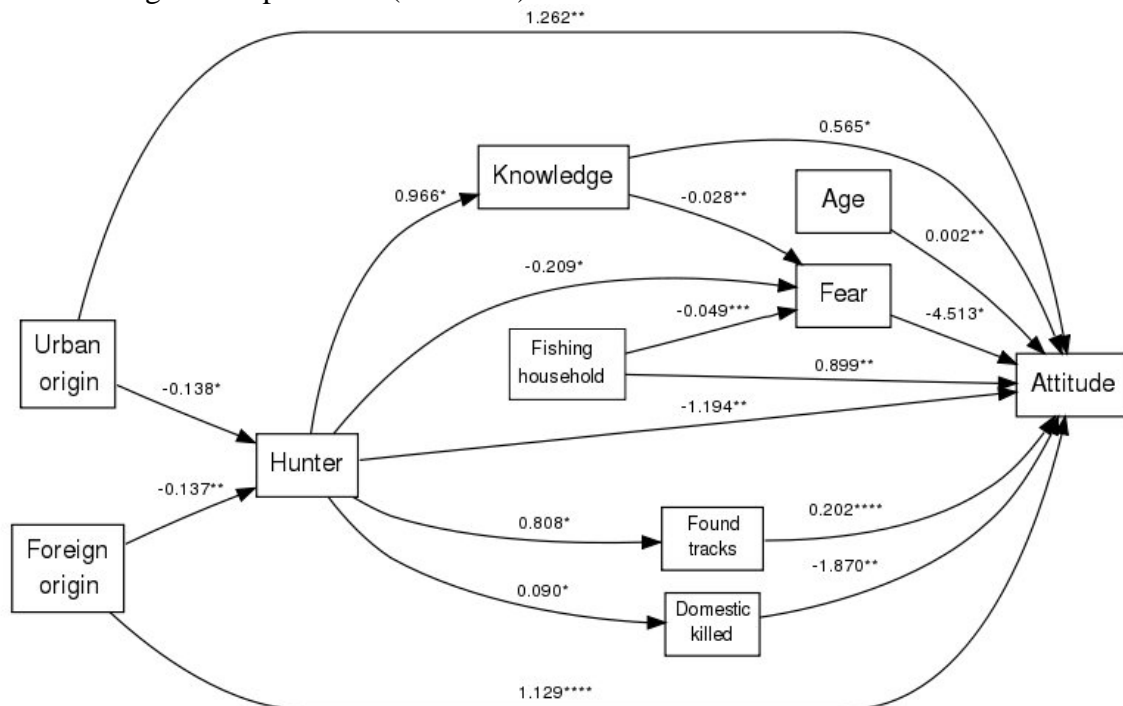


Figure 8: Effect of age, urban origin, foreign origin, fear of bears, living in a fishing household, being a hunter, knowledge about predators, having domestic animals killed and finding tracks of bears on the attitudes toward bears. GFI was 0.964. AGFI was 0.929. Bentler-Bonnett NFI was 0.713. SRMR was 0.057. **** P = 0, *** P < 0.0001, ** P < 0.001, * P < 0.05

The inclusion of parents origin in the model in figure 9 also shows a drastic decrease in the direct effect of urban origin (from $r = 1.262$ to $r = 0.634$) while parents of urban origin had twice as big effect on attitudes ($r = 1.250$).

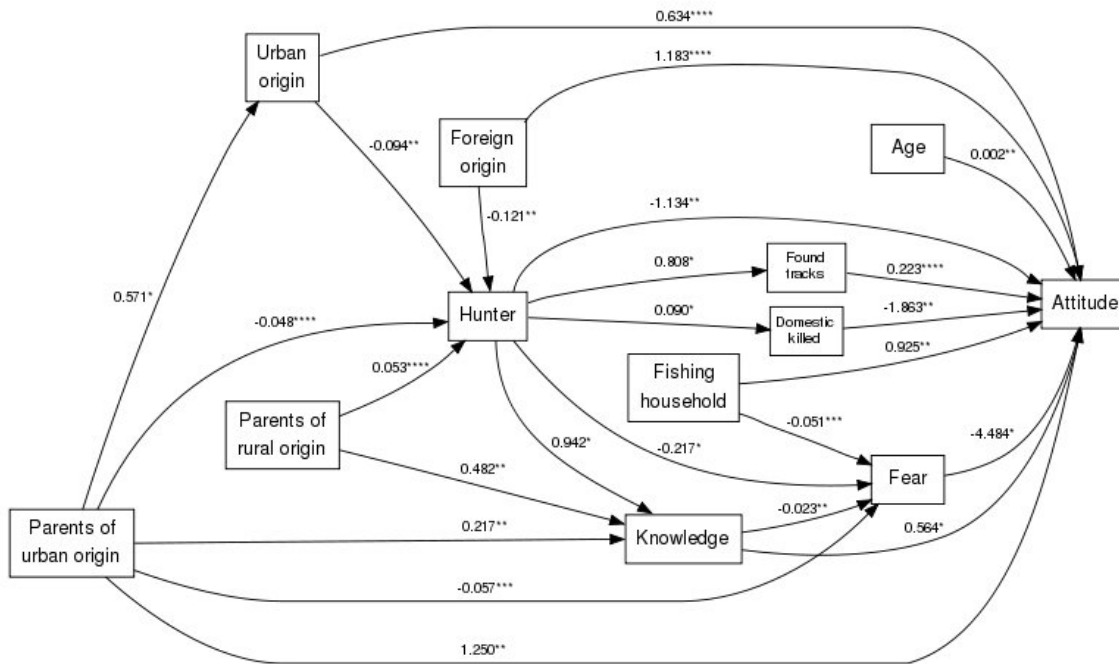


Figure 9: Path analysis of variables having an effect on the attitudes toward bears, including parents of urban or rural origin. GFI was 0.921. AGFI was 0.852. Bentler-Bonnett NFI was 0.589. SRMR was 0.094. **** P = 0, *** P < 0.0001, ** P < 0.001, * P < 0.05

Discussion

In this survey about the Swedish population the attitude score was at about 70 % of maximum, which is significantly lower than all the other surveys from Europe I have found. In Croatia, Slovenia, Estonia, UK (children) and Italy the attitude score was about 80 % where 50 % would be neutral (Kaszensky 2004, Majic 2003, Promberger et al. 2000, Randveer 2006, Trent province 2003). In Latvia only a few percent of the respondents wanted to reduce the number of bears (Andersone & Ozolins 2004).

Therefore, it seems Swedes have a less positive attitude towards bears than other Europeans. That is contrary to my prediction. The reasons for this could be that bears are so common in Sweden now that they are not considered threatened, while at the same time a large portion of the population perceive them as threatening. Another explanation could be that the surveys did not have the same design, so my comparison – even though I have looked at questions that are similar – may be subject to interpretation which makes a comparison biased.

Ericsson & Heberlein (2003) found that when knowledge about wolves increases, the attitude towards wolves becomes more negative. In this regard, attitudes toward bears in Sweden have the opposite relation to knowledge as attitudes toward wolves do according to my results. There are numerous fatalities and injuries associated with bears in other countries while fatalities and injuries associated with wolves are very rare or non-existent, but more people in Sweden are afraid to meet a bear than are afraid to meet a wolf. Fear of bears has a significant effect on attitudes toward bears, which has also been shown in previous studies (Kaczensky 2004 with references). Still, the attitude mean toward bears in this survey is significantly higher than the attitude mean toward wolves in the Ericsson & Heberlein survey from 2003. The effect of having a domestic animal killed by a predator only lowered the attitude score by about 12 % in this survey while the Ericsson & Heberlein survey from 2003 shows that attitudes toward wolves are lowered about 17 %

from predation experience. In a Slovenian study, attitude toward bears was only lowered 5 % from negative experiences with bears (Kaczensky 2004). This means that direct experience and what is written in the media is not as important in forming attitudes toward bears as it is for wolves. There could be a general difference in how people view these two predators, i.e. the wolves as bloodthirsty and the bears as cuddly, but such views were not measured in this survey. Social experiences were not measured in this survey either, but culture also has an effect on attitudes (Matsumoto 1993). If we compare wolves and bears in a social experience context, Swedish children learn a song about the little boy Olle who went into the forest to pick berries and finds a nice bear to keep him company at about the same age as they read the story about red riding hood who has her grandma eaten by the wolf. Later in life Swedish people read newspaper articles that explain how bears are vegetarians to a great degree while wolves attack and kill innocent dogs. Such social experiences may have a greater impact on the attitudes toward bears and wolves than what is recognized in recent surveys. A large portion of the variation in attitudes toward bears remains to be explained, as can be seen in the path analysis, which could be because the survey was designed with current experiences of attitudes toward wolves in mind.

When comparing attitude items C, E and F in Table 1, it seems like urban people are more opinionated about bears than people in the countryside are. Knowledge about predators is also slightly lower with respondents who had an urban upbringing. Since there are also a lot more people living in urban areas, this means they greatly affect the statistics unless the two groups are separated. A general survey of Swedes that does not take current and/or previous residence into account will most likely get skewed results because of this difference. The path analysis also suggests that the origin of the parents is rather important to what attitude the respondent has toward bears. The fact that more urban people are afraid of bears than rural people are, but still think it is more important to have bears in Sweden, implies that urban people are to some extent basing their attitudes on the fact that they will always be distant from bear habitats. Those attitudes may change if the bear habitats expand to the south of Sweden, so they are seen and experienced closer to where urban people live.

My results show that parents have a great underlying influence on the attitudes toward bears. If upbringing is the most important factor in forming attitudes toward bears, we have to ask what the real differences in a rural or urban upbringing is. It is obvious that most people, even in the countryside, never had any direct experiences with bears. That also makes it unlikely that rural people have less positive attitudes toward bears because of indirect experiences such as a neighbour having their domestic animals killed by bears, although that was not measured in the survey. With direct experiences having a minimal impact on the attitudes toward bears, it is obvious we need to look for the basis for these attitudes in variables that measure social experiences.

The expansion of the bear population where they infringe on rural communities is a probable cause to why the fear is high. As long as the predators are perceived to be distant from the respondent's home, I think they feel safe and are more inclined to regard the bears as cuddly and cute animals they can watch on TV. When it becomes more likely to encounter a bear, the fear of these animals take over and attitudes decline. So the large and widespread bear population in Sweden compared to other European countries is a possible explanation to why attitudes toward bears are slightly lower here.

In the same period of time that the brown bear in Sweden was almost wiped out and then re-established, there has also been an important change in the Swedish society. In the 19th century Sweden was characterized by emigration, but during the past decades Sweden has become a country of high immigration (SCB 2007). While the Swedish government tries to integrate these immigrants into the Swedish society and culture, not only the immigrants but also their foreign culture is merged into our society (Matsumoto 1993,

Bodén 2004). As the influence of these immigrants and their descendants increases, it becomes more important for decision makers to consider the differences between cultural groups (Dzingirai 1996, Allard 2000). However, discerning cultural boundaries between groups is very difficult (Matsumoto 1993). This survey included a question of geographic upbringing where the respondent could choose Nordic country other than Sweden, European country or other country outside of Europe. When looking at this question it turned out that only 0.2 % of the respondents were immigrants from outside of Europe. This indicates a possible bias in the survey, since there are a lot more immigrants than that in Sweden (SCB 2007). It is possible that there are language issues or just a lack of interest that makes the immigrants less prone to answer surveys such as this one. The data in this survey was never corrected for this bias. To get a feeling of what the differences of attitudes would be, some of the questions were analysed especially for immigrants, even though the results was not statistically significant because of the small number of respondents. It turned out that 90 % of immigrants from outside of Europe were afraid of bears. Since fear of bears has a major effect on the attitude toward bears, it is quite possible that the attitudes of immigrants from outside of Europe differ to a great degree from those of rural or urban Swedes. Respondents that were represented in the path analysis here as “foreign origin” consists mainly of immigrants from Nordic countries. With a survey that takes the immigrants from outside of Europe into consideration, the attitudes toward bears in Sweden might be even lower.

Future surveys on the attitudes toward bears in Sweden need to recognize the social components that form attitudes. More focus needs to be turned to social experiences like events during the respondents upbringing (i.e. was their favourite children's story “Goldyllocks” or “Cinderella”). Current events and the attitudes to single newspaper articles about bears could provide hints to what the attitudes are based on if the respondent is asked to reflect on those. We have recently had a couple of fatalities associated with bears in Sweden, and it would be interesting to see if the general attitude toward bears has changed because of those. Immigrants also need extra attention, to ensure a proper response rate as well as making sure their origin is taken into consideration (i.e. did they grow up in a country with a lot of bears or without contact with bears). More effort should also be put on trying to explain the impact of parents or grandparents on the attitudes toward bears. If there were more details to the questions about place of residence during upbringing and current residence, such as the number of years a respondent has spent in each place. This would also help to build up a more complete picture of how residence affects attitudes. The difference between the variation of attitudes toward wolves and bears should also be recognized so future surveys have separate questions for these animals that take these differences into consideration.

If the universities around Europe could cooperate to standardize some of the questions that go into these surveys, that would also help a lot with future studies as the data would be easier to compare between different countries.

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