Self-reported human fear of spiders across demographic groups in Norway

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Conservation of wildlife depends upon people's attitudes toward the various animal species. For example, conservation of invertebrates may be difficult due to fear and dislike of this animal group. We measured the prevalence of self-reported fear of spiders in a representative sample of the Norwegian population. Nine per cent answered 'very much afraid', 16 % 'somewhat afraid' and 75 % 'not afraid'. The rate of self-reported fear ('somewhat' and 'very much') was higher among women (32 %) than among men (14 %). The elderly expressed a lower level of fear than did younger age groups, and respondents with more education reported less fear than did those with less education. Self-reported fear was at a lower level in rural than in urban areas, and higher in Central and Northern Norway than in other regions. These differences may be due to differences between groups in experience with spiders.

Key words: spider, fear, demographic groups

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INTRODUCTION

Conservation of wildlife is heavily dependent upon the values that people ascribe to categories in the natural surroundings. For example, the public awareness of the ecological and utilitarian value of invertebrates is limited, and antipathy, aversion and fear toward these animals is widespread. Costello (1982) interviewed women in Canada, and found that animal fears (dogs, snakes, cats, spiders, insects) were the most prevalent type of fear, with a rate of 429/1000. The rate declined with increasing age, but was unrelated to educational level. In Illinois, USA, Kirkpatrick (1984) found women's fear responses to bats, spiders, mice and rats to be relatively constant across the age groups, and that 30% of the women reported no fear of spiders. In the UK, Davey (1994) showed that 40% of the respondents were anxious or very frightened by wasps; the corresponding figures were 28% for spiders and 22% for bees. There was no significant effect of age group regarding fear of invertebrates. In a Dutch community sample Arrindell (2000) found that 85% were from a little to very much afraid of wasps. The figures were 58% and 52% for fear of spiders and bees, respectively. Age correlated negatively with fear of dry or non-slimy invertebrates. In a general public sample in Connecticut (USA), Kellert (1993) found that fear, dislike, and indifference toward invertebrates (insects and spiders in particular) were the most frequently encountered view. Most of the respondents indicated a dislike of ants, bugs, beetles, tics, and cockroaches. Many people were "afraid of most spiders" (44%), and 72% agreed to the statement "World better place if mosquitoes were eliminated". The most infrequently encountered attitudes toward invertebrates were those indicating affection, ethical concern, or scientific curiosity. A comparison between demographic groups showed that respondents with less education, the elderly, and females expressed the highest levels of fear (negativistic attitude type). The sex difference in spider fear has been found in several previous studies (e.g., Cornelis & Averill 1983).

Fredrikson et al. (1996) analysed gender and age differences in the prevalence of specific fears and phobias in a randomly selected sample of residents in Stockholm, Sweden. Using a scale from 0 (no fear at all) to 100 (maximal fear), a score of 21 appeared for spiders. By comparison, the score for snakes was 38. Women expressed more fear of these animals than males did, and younger subjects expressed more fear than older subjects did. The prevalence of spider phobia was 1.2 % for men, and 5.6 % for females. Studies in psychiatric epidemiology indicate that about five per cent of crippling phobias and 15 % of milder phobias are of specific animals. The vast majority of animal phobias are reported by women (Rosenhahn & Seligman 1995, p. 219-220).

The low degree of attractiveness of insects and spiders appears relatively early in life. Kellert & Westerveld (1983) asked children in Connecticut to rate 33 animal species along a scale from "really

like" to "really don't like". Snake, rats, wasps, and scorpions received the lowest rankings. In a study among 9-14-year-olds in Norway (Bjerke et al. 1998), spiders, ants, and bumble-bees were disliked. The spider was perceived as the most boring, ugliest, most stupid, and least useful of some species rated along bipolar adjective dimensions, but few respondents considered the spider to be dangerous.

The negative attitude toward invertebrates is reflected in our media. In a study of how animals are presented on children's television, Paul (1996) found that when invertebrates were shown to be killed or otherwise suffered cruelty, little or no comment or condemnation accompanied the story. But when mammals were harmed, children were asked to condemn the aggressor. Possibly we may empathise more with species that are like human beings.

The conservation of wildlife will benefit from a better understanding of why we often react with hostile and negative feelings toward most invertebrates, and to spiders and insects in particular. It has been hypothesised that there is a biologically prepared tendency to learn fear of some species very quickly (Öhman 1986), and twin studies indicate a moderately high coefficient of heritability for small animal phobias (e.g., Lichtenstein & Annas 2000, Skre et al. 2000). Additional factors contributing to fear of these animals may be differences in ecology and size, the multiplicity of invertebrates, and the apparent lack of individual identity and consciousness (Kellert 1993).

When discussing causes and correlates of animal fears, scientists most often have tried to identify genetic/evolutionary or cultural learning influences, i.e., the classic "nature vs. nurture" problem has been revitalised (Seligman 1971, Jones & Menzies 1995, Merckelbach et al. 1996, Fredrikson et al. 1997, King et al. 2000). In addition, an association has been shown to exist between fear of some animal groups and the food-rejection response of disgust. Disgust sensitivity has been shown to be related to fear of animals that are normally harmless in the environment where the studies have been conducted, but that nevertheless are fear-evoking (e.g., spider, rat, snake), and to animals that usually evoke disgust (e.g., slug, snail), but unrelated to animals considered to be both fear-evoking and physically harmful (e.g., lion, tiger, shark) (Matchett & Davey 1991). Common animal fears, and the aversion toward invertebrates, may be partly explained by a disease-avoidance, in addition to or rather than a predator-defence process (Davey 1992). Thus, asking people about their animal fears, phobias, likes or dislikes, or their objects of disgust, probably tap related but somewhat different aspects of more general and relatively complex attitudes toward animals. More research is needed to entangle the structure of these negative attitudes.

The aim of the present report has been to gain more knowledge about the prevalence of self-reported spider fear, and about how this fear relate to demographic variables. The main strength of our analyses is that the data were obtained through a representative sample of the Norwegian population, while previous studies relied on more restricted samples.

METHODS AND MATERIAL

Sampling and data collection

The respondents were recruited by phone (Telenor's directory) on the basis of a mathematically correct sample of the population (15 years +) in each of the 19 counties of Norway. The family member who had had his/her birthday most recently was asked to participate. Totally, 3500 respondents were recruited in this way. Second, the questionnaire with a pre-stamped reply envelope was sent by post to the 3500 recruited persons in November 2000. Ten days later a reminder was sent to all respondents, and a second reminder (including the questionnaire) was posted in December. 73% of the recruited persons completed and returned the questionnaire. Due to missing values the reported multivariate analysis (see later) is restricted to 2217 respondents.

The questionnaire

In addition to the socio-demographic variables (age, sex, education, etc.), the questionnaire consisted of the respondent's outdoor activities, environmental value orientations, cultural value orientations, basic values in life, political preferences, opinions about the acceptable size and distribution of the large carnivores (bear, lynx, wolf, and wolverine), opinions about acceptable behaviours of these animals, about acceptable wildlife management actions, the connotative meanings of the four carnivore species (semantic differential technique), and about fear of the animals.

Analyses

The dependent variable in the study is the answer given to the question, 'To what extent would you say that you are afraid of spiders' (current prevalence). The response categories to this question were 'Not afraid', 'Some what afraid', and 'Very much afraid'. Respondents who answered 'Do not know' were deleted from the analysis.

Independent Variables: Gender is coded 1 for women and 0 for men. In the questionnaire, age is an ordinal variable (15-24 years = 1, 25-34 years = 2, 35-44 years = 3, 45-54 years = 5, 55-64 years = 5, and 65 years or more = 6). Education is also an ordinal variable (primary school = 1, secondary school = 2, vocational training = 3, < 4 years in college = 4, and ≥ 4 years in college = 5). The variable urban residency has five values (number of inhabitants in parentheses): large city ($> 40\,000$) = 1, city (10-40 000) = 2, small city (3-10 000) = 3, location with less than 3000 = 4), and sparsely populated area = 5. Finally, the variable location also has five values:

Eastern Norway = 1, Southern Norway = 2, Western Norway = 3, Central Norway = 4, and Northern Norway = 5. Save for gender and location the remaining independent variables were treated as continuous variables in the reported analysis, since initial analyses (not reported) clearly indicated that their effects were linear.

Multivariate Procedure: The dependent variable representing fear of spiders is ordinal by nature. Hence, the relationship between the dependent variable and the independent variables gender, age, education, urban residence, and location is estimated using ordinal logistic regression analysis (Long 1997).

RESULTS

Table 1 displays the results of the ordinal logistic regression between the dependent fear variable and the independent variables. Inspection of the signs of the coefficients shows that women are more afraid of spiders than men. Also, there is a negative association between both age and education and fear of spiders. In other words, older people and people of higher educational attainment are less afraid of spiders than younger people and poorly educated people. The negative coefficient for urban residence indicates that people living in sparsely populated areas are less afraid of spiders than those living in an urban environment. Finally, people living in Central Norway and Northern Norway are more afraid of spiders than those living in Eastern Norway (the reference category).

Table 1. Fear of Spiders by Gender, Age, Education, Urban Residence, and Location. Ordinal Logistic Regression Results.

Independent Variables	b[a]	
Gender (Women = 1)	1.092**	(.106)
Age	-.238**	(.037)
Education	-.231**	(.039)
Urban residence	-.081*	(.035)
Location:[b]		
Southern Norway	.050	(.178)
Western Norway	-.263	(.142)
Central Norway	.407**	(.155)
Northern Norway	.517**	(.162)
Log Likelihood	-1500.90	
LR chi-square/df	215.25/8**	
N	2217	

Note. Standard errors are in parentheses.
[a] Ordinal logistic regression coefficients.
[b] Reference category = Eastern Norway.
* Significant at 5%-level. ** Significant at 1%-level.

Unfortunately, the ordinal logistic regression coefficients in Table 1 lack an intuitive metric. To facilitate the interpretation of the results we have therefore converted the coefficients in Table 1 into the predicted probabilities in Table 2, Panel A – E. Panel A in

Table 2. Fear of Spider-categories by Gender, Age, Education, Urban Residence, and Location. Predicted Probabilities.

Independent Variables	Not afraid	Some what afraid	Very much afraid
Panel A[a]			
Gender			
Men	.86	.10	.04
Women	.67	.21	.11
Panel B[b]			
Age			
15-24 years	.79	.14	.07
25-34 years	.83	.12	.05
35-44 years	.85	.10	.04
45-54 years	.88	.08	.04
55-64 years	.91	.07	.03
65 years or more	.93	.05	.02
Panel C[b]			
Education			
Primary school	.79	.14	.07
Secondary school	.83	.12	.05
Vocational training	.86	.10	.04
< 4 years in college	.88	.08	.03
≥ 4 years in college	.91	.07	.03
Panel D[b]			
Urban residence			
Large city (> 40 000)	.84	.11	.05
City (10-40 000)	.86	.10	.04
Small city (3-10 000)	.86	.10	.04
Small city (< 3 000)	.87	.09	.04
Sparsely populated area	.88	.08	.03
Panel E[c]			
Location			
Eastern Norway	.86	.10	.04
Southern Norway	.85	.10	.04
Western Norway	.89	.08	.03
Central Norway	.80	.13	.06
Northern Norway	.79	.15	.07

Note. The predicted probabilities are based on the coefficients in Table 1. Some probabilities do not sum to a 100 percent due to rounding.
[a] Refers to a person living in Eastern Norway with mean values on the remaining independent variables.
[b] Refers to a man living in Eastern Norway with mean values on the remaining independent variables.
[c] Refers to a man with mean values on the remaining independent variables.

Table 2 shows that women are clearly more afraid of spiders than men; 32 percent of the women are either somewhat afraid (21 percent) or very much afraid (11 percent), whereas the analogous figure for men is 14 percent. Regarding age, only 7 percent of those aged more than 65 years are afraid of spiders (5 + 2), whereas 21 percent of those aged between 15 and 24 years are afraid. Also, people with more education have a lower probability of being classified as very much afraid (or somewhat afraid). Concerning urban residency, we see that people living in sparsely populated areas have a slightly less probability of being classified as afraid of spiders. Finally, people living in especially Northern Norway have a higher probability of being afraid of spiders (15 + 7 = 22 percent) than people living in Eastern Norway (10 + 4 = 14 percent).

DISCUSSION

The rate of self-reported fear of spiders was lower in the Norwegian national sample than in the Dutch sample (Arrindell 2000) and in the two samples from the U.S.A. (Kirkpatrick 1984, Kellert 1993), but similar to what was found in England (Davey 1994). A higher rate in the U.S. samples seems reasonable, since some poisonous spider species exist there (and not in Norway). But methodological factors (sampling, scale categories, etc.) may also have contributed to these differences.

Since 75 % of Norwegians answer "not afraid" of spiders, fear of these animals should not represent a serious obstacle to their existence or preservation. Spiders might, however, more likely be a victim of human disgust, since people more often express a dislike toward them (Davey 1992). Bjerke et al. (1998) showed that among Norwegian adolescents, spiders were the most disliked animals group of species among 20 common species or groups mentioned. Boys liked insects and spiders more than girls did, and only 3-5 % of the children wished to save the insect species mentioned from extinction. On this background the negative attitude toward spiders could be turned more positive if teachers and wildlife managers more clearly showed the ecological value of these species.

Our findings are in agreement with previous reports about a higher level of self-reported fear of spiders among women than men. A multitude of evolutionary/genetic, physiological and social/cultural factors may be drawn upon to explain such sex differences, but epidemiological designs do not lead us to any cue to the most promising explanatory model. Part of the explanation could be a simple one: Women are more honest than men and more easily admit their fears. However, some previous studies lend no support to this explanation (Cornelius & Averill 1983, Fredrikson et al. 1996). Thus, processes during sex role socialisation and/or various genetic/physiological variables seem to be important.

A negative correlation between self-reported fear of spiders and age has been found in some studies (e.g., Costello 1982, Fredrikson *et al*. 1996, Arrindell 2000), while no correlation has been the result in other studies (Davey 1994). Exposure therapy has proved to be very effective in curing spider phobia (Rosenhan & Seligman 1995). Thus, it seems likely that experience with such animals should result in lower spider fear. Assuming that older people in general have more experience than younger age groups with invertebrates, this could explain the effect of age. The argument holds only when the experience with the animals is neutral or positive. If the experience is negative and costly, like when carnivores kill livestock, it may result in a higher level of self-reported fear of large carnivores. There is a strong positive association between age and self-reported fear of large carnivores (Bjerke et al. 2001), probably because of the strong anti-carnivore sentiments that prevailed until a few decades ago.

The lower level of self-reported fear among respondents with more education may reflect the effects of both experience and knowledge concerning the harmless nature of Norwegian spiders, and the ecological values stimulated through various school curricula.

Bjerke & Bevanger (2002) showed that the inhabitants of Central and Northern Norway reported more fear of the adder (*Vipera berus*) compared to people in Southern Norway. The same pattern appears in the results of the present study of spider fear. Like for the effects of age and education we hypothesise that the effect of 'part of country' is due to differences in experience and knowledge about the species in question. This is speculative, however, since insects and spiders may occur in large numbers in Northern Norway. But the number of species may be lower, and the winter season lasts longer, reducing the experience of people with such animals. Similarly, a lower level of self-reported fear among rural than among urban residents may be explained by the effects of experience.

In conclusion our results indicate that contact and experience with animals should be an important part of environmental education, if one wishes to reduce negative attitudes toward them. Fear of animals most often have their time of onset in childhood. Therefore, such experience will be most effective if teachers and other role models teach about and expose children and adolescents to the animal, following the fundamental principles of fear reducing therapies. These principles include desensitisation by creating a relaxing situation, exposing the students to the animal, and modelling (showing how to approach and handle the animal). In addition, wildlife managers could more clearly inform the general public about the ecological significance of disliked animal species.

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SAMMENDRAG

Spørreundersøkelse om frykt for edderkopper i Norge

Mange undersøkelser har vist at folk flest liker insekter og edderkopper dårlig. Få er svært redde for dem, men enkelte utvikler fobier for slike arter. Vi utførte en spørreskjemaundersøkelse om bl.a. folks frykt for noen dyrearter i et representativt utvalg av den norske befolkningen (n = 3500, svarprosent 73). Ni prosent svarte at de er svært redd edderkopper, 16 % svarte 'litt redd' og 75 % svarte 'ikke redd'. Selv-rapportert frykt (svært + litt redd) var høyere blant kvinner (32 %) enn blant menn (14 %). Færre eldre enn yngre uttrykte frykt, for eksempel svarte sju prosent av folk over 65 år at de er redd edderkopper (svært + litt), mens andelen som svarte dette i 15-24-årsgrupppen var 21 %. Folk med lengre utdanning uttrykte lavere frykt enn de med kortere utdanning, og selv-rapportert frykt var lavere i rurale enn i urbane områder. Det var også litt høyere nivå av selv-rapportert frykt i Midt- og Nord-Norge enn i andre landsdeler. Resultatene kan et stykke på vei foklares ved at kunnskap og erfaring med en dyregruppe reduserer frykten for den. Vi kan nok lære å frykte dyr, men minst like viktig er det at vi kan lære *ikke* å frykte dem.

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