THE INFLUENCE OF WILDLIFE VALUE ORIENTATIONS, CONNECTEDNESS TO NATURE, AND RELIGIOSITY ON THE FEAR OF WOLVES AND WILD BOAR

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Abstract. *Knowing the factors affecting fear of large carnivores is important for wildlife management and conservation. In this regard, the effect of worldviews of human-wildlife and human-nature relationships on the fear of large carnivores needs to be investigated in different cultures. In this study, the influence of wildlife value orientations (WVOs), connectedness with nature, religiosity, fear of dogs, and gender on the fear of wolves and wild boars were examined. Quantitative research was conducted via a questionnaire on a convenience sample of 656 university students from state universities in various regions of Turkey. Domination orientation did not influence the fear of either animal. Mutualism negatively influenced the fear of wolves but did not significantly influence the fear of wild boar. Connectedness to nature is related negatively to the fear of both animals. More religious students feared wild boars more. Female students had a greater fear of both animals than male students. In addition, students with a fear of dogs had a greater fear of both animals. The relationship between worldviews and fear of large carnivores can vary across different species and needs to be investigated in different cultures.*

Keywords: *wildlife value orientations, connectedness to nature, religiosity, fear of wolves, fear of wild boar*

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Introduction

Wildlife evokes a wide variety of emotions in humans, such as admiration, disgust, and fear. Some of these are biological predispositions (Seligman, 1971) that are products of evolutionary survival adaptations (Jacobs, 2009). Emotions toward wildlife can also be acquired through learning, as in cultural transfers or conditioning via individual experiences (Jacobs et al., 2012). An emotion often associated with large carnivores is fear (Ambarlı, 2016; Dervişoğlu & Menzel, 2024b; Jacobs et al., 2014; Johansson & Karlsson, 2011; Prokop et al., 2024; Røskaft et al., 2003). Fear of large carnivores can reduce the quality of life of people in carnivore territory (Skogen & Krange, 2003) and also can reduce support for their protection (Hermann & Menzel, 2013; Johansson et al., 2012; Prokop et al., 2024). Therefore, understanding the factors that explain the fear of large carnivores is an important issue for wildlife management and conservation. In this regard, Prokop et al. (2024) suggested that humans inherited fear of large animals from their mammalian ancestors who were exposed to the predation of large reptiles for long periods during prehistoric times. As environmental context, the perceived threat from large carnivores and the perceived inability to control their own behavior during encounters have been shown to play an important role in fear of the animal (Johansson & Karlsson, 2011; Johansson et al., 2012). Previous negative experiences also seem to be related to being more afraid of large carnivores (Mohammadi et al., 2021; Valente et al., 2024).

The fear of large carnivores can also be associated with sociodemographic factors. For example, some studies have shown that people in wolf territory are less afraid of them (Ericsson & Heberlein, 2003; Røskaft et al., 2003). On the other hand, people living in the territory of large predators could have more negative attitudes due to the risk of a dangerous encounter and damage (Røskaft, et al., 2007; Zimmermann et al., 2001). Indeed, findings covering larger time periods suggest that long-term coexistence with wolves is associated with more negative attitudes toward them in addition to a greater fear of them (Barmoen et al., 2024; Dressel et al., 2015; Ericsson et al., 2010). Additionally, the fear of large carnivores can also vary among different interest groups. For example, it was found that livestock owners were more

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afraid of wolves (Valente et al., 2024), and hunters were less afraid (Ericsson & Heberlein, 2003). Gender has also been reported to be associated with fear of large predators, with females generally being more afraid than males (Kaltenborn et al., 2006; Prokop & Fančovičová, 2010; Prokop et al., 2021; Røskaft et al., 2003; Siard & Jordan, 2018).

The relationship between worldviews and emotions toward wildlife is poorly understood. For example, people can have more positive attitudes toward wildlife species that are local icons (Castillo-Huitrón et al., 2024). Superstitions and myths about wildlife can also influence emotions toward them. For example, Prokop et al. (2024) show that superstitious beliefs about large carnivores, e.g. that their powers and protection could be transferred to people wearing certain parts of them, indirectly influence admiration for them via admiration of non-animal objects. Similarly, it has been revealed that belief in myths about bats is associated with negative attitudes toward them (Musila et al., 2018; Prokop et al., 2009). Additionally, research (Dervişoğlu & Menzel, 2024a; Landon et al., 2020) has shown that individuals' emotions toward wildlife can be influenced by their wildlife value orientations (WVOs), which reflect their worldview as it pertains to the human-wildlife relationship (Manfredo et al., 2009, 2020). People with mutualism orientation, which is one WVO, view wildlife as having similar rights as humans and as family members (social affiliation belief). They also find wildlife worthy of care and feel a positive emotional connection with them (caring belief) (Manfredo et al., 2009, 2020). According to domination, another WVO, wildlife should be used for the interest of humans (appropriate use belief) and hunting wildlife is acceptable (hunting belief). In one study (Landon et al., 2020) with Illinois residents, the "appropriate use belief" of domination was associated with stronger negative emotions toward wolves. "Hunting beliefs", on the other hand, are associated with weaker negative emotions. In this regard, studies have also shown that hunters (Ericsson & Heberlein, 2003) and people who are interested in hunting (Røskaft et al., 2003) are less afraid of wolves. Based on this, domination-oriented individuals are expected to be less afraid of large carnivores and also game animals. In a cross-cultural study (Dervişoğlu & Menzel, 2024a) with a Turkish and German sample, German students with a stronger domination orientation were found to have stronger negative emotions (e.g. anger, sadness) toward problems caused by the presence of wolves. Mutualism, on the other hand, indirectly (negatively) affected these negative emotions by being associated with lower threat perceptions from wolves in the Turkish and German samples. Thus, mutualist-oriented individuals are also expected to have less fear of large carnivores.

Religious beliefs can also shape people's views of nature (Slimak & Dietz, 2006) and wildlife (Bhatia et al., 2017; Li et al., 2014). Research findings on the relationship between religion and emotions toward wildlife are inconsistent. There is evidence that religious beliefs regarding wildlife can influence emotions felt toward it. For example, seeing elephants as gods relieves the stress felt about their potential to cause damage (Gogoi, 2018). Similarly, it has been shown that if there is no personal experience of a wolf attack, religious beliefs (e.g. a person being cursed if he/she kills a wolf) can influence a person's fear of wolves (Mohammadi et al., 2021). Religiosity was also found to be associated with a higher perceived threat from wolves and stronger negative emotions (e.g. anger) toward problems caused by the presence of wolves (Dervişoğlu & Menzel, 2024a). On the other hand, Bhatia et al. (2017) report that religiosity was associated with positive attitudes toward snow leopards and wolves in Buddhist but not Muslim communities. In another study, Castillo-Huitrón et al. (2024) found no significant relationship between religion and emotions toward wildlife. Religions generally encompass a wide range of beliefs about the world and also animals, so the relationship between religion and emotions toward wildlife needs to be examined in different religious groups and cultures.

The biophilia hypothesis proposes that there is an evolutionary affinity between humans and nature (Kellert & Wilson, 1993). Accordingly, the extent to which people feel connected to nature may affect their emotions. Research points to a positive relationship between connectedness to nature and happiness (Capaldi et al., 2014). Likewise, Kubiatko et al. (2021) report that students with a fear of bees and wolves had a lower nature relatedness. Similarly, Cho and Lee (2018) observed that children who have more contact with nature are less afraid of wildlife. In addition, there is also evidence that people interested in nature activities (e.g. walking in nature) were less afraid of large carnivores than those who were not interested (Prokop & Fančovičová, 2024; Prokop et al., 2011; Røskaft et al., 2003). Therefore, people with a stronger connectedness with nature can be expected to be less afraid of large carnivores.

Considering that value orientations and religious beliefs can vary among cultures, it is important to examine their influence on emotions toward wildlife in culturally diverse societies. The aim of this study is to examine the influence of WVOs, connectedness to nature, religiosity, and gender on the fear of wolves and wild boar in a sample from Turkey. Considering that some dogs resemble wolves, the fear of wolves can be a result of the fear of dogs. Therefore, the influence of the fear of dogs on the fear of wolves was also examined. Wolves (*Canis lupus*) and wild boar (*Sus scrofa*) are widespread and conflict-prone animals in Turkey, causing financial damage to farmers (Ambarlı,

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2019; Chynoweth et al., 2016). Both can cause injuries and fatalities to humans (Linnell et al., 2021; Mayer et al., 2023) and both are animals that people are afraid of (Ambarlı, 2016; Dervişoğlu & Menzel, 2024b; Johansson et al., 2011; Røskaft et al., 2003). Wolves live in almost every region of Turkey (around 6,000 wolves) (Ambarlı, 2019; Ambarlı et al., 2016) and are protected species (Resmi Gazete, 2003). According to the Islamic faith, pigs (or wild boar) are forbidden to eat and are considered dirty (Foltz, 2014). This negative view of pigs in Islam could lead to more religious Muslims being more afraid of wild boar. Fear was examined as an emotional disposition (Jacobs et al., 2012). We formulated the following hypotheses per the theoretical basis and empirical findings mentioned above:

H_1: Domination would negatively influence the fear of wolves and wild boar.
H_2: Mutualism would negatively influence the fear of wolves and wild boar.
H_3: Religiosity would positively influence the fear of wolves and wild boar.
H_4: Connectedness to nature would negatively influence the fear of wolves and wild boar.
H_5: The fear of dogs would positively influence the fear of wolves.
H_6: Female students would have a greater fear of wolves and wild boar than male students.

Research Methodology

General Background

A subset of data from a larger study (Dervişoğlu & Menzel, 2024a, 2024b) conducted in Turkey and Germany is presented here. A study was conducted using a paper-and-pencil questionnaire. The questionnaires were administered in April and May 2016 at some state universities in Eastern Anatolia, Central Anatolia, the Aegean, and the West Black Sea regions of Turkey. Participation was voluntary and students were informed in advance about the purpose of the study.

Sample Selection

A convenience sample of 656 university students (179 male, 469 female, eight unspecified) was used in the study. The students were between 18 and 36 years old ($M = 21.71$; $SD = 2.19$; 3.4% missing). The academic majors of participants were Chemistry/Chemistry Teaching (ca. 25%), Computer Teaching and Instructional Technologies (ca. 20%), Elementary Science Teaching (ca. 18%), Primary School Teaching (ca. 10%), Biology/Biology Teaching (ca. 6%), Preschool Teaching (ca. 6%), other (ca. 6%), unspecified (ca. 9%). 71.2% of the participants reported aiming to become a schoolteacher (5.2% missing). The questionnaire asked about the participants' religious affiliation. Overall, 93.6% of students said that they were Muslim, 0.3% said that they were Christian, 0.6% responded with other, and 5.3% said that they did not belong to a religion.

Instruments

The items measuring fear were part of a six-item scale measuring negative emotions toward problems caused by the presence of wildlife that was part of a questionnaire originally developed by Hermann and Menzel (2013, 2015). The authors of this paper adapted the scales to the context of the "wildlife presence". The questionnaire was originally in German and adapted to Turkish by back-translation. The German questionnaire was translated into Turkish by one of the authors, a bilingual expert in biology education, and then back-translated by another bilingual expert in biology didactics. All discrepancies that arose were discussed by both experts and they generated a consensus. For more detailed information about the whole questionnaire, see Dervişoğlu and Menzel (2024a, 2024b). To measure fear, participants were asked what they thought about the presence of wolves and wild boars. Two items were used: "When I think about the animal's presence, I already have a queasy feeling" and "I am afraid of the animal". A photo of a wolf, a wild boar, and also a short informational text about both animals were presented on the questionnaire. The items toward emotions included the word "animal", referring to wolves and wild boar. Accordingly, each item had to be answered twice, once for the wolf and once for the wild boar. The questionnaire included the 19-item WVO scale (Manfredo et al., 2009) including some modifications (Hermann & Menzel, 2013). Both the emotion and WVO scales were 5-point (1: strongly disagree to 5: strongly agree). Connectedness to nature was measured with the scale "inclusion with nature in self (INS)" developed by Schultz (2002). This one-item scale consists of seven circles, one named "I" and the other "Nature", overlapping to varying degrees. The extent of the

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overlap between these two circles shows the connection with nature. Accordingly, participants were required to select the image that best described their relationship with nature. Religiosity was measured using three questions with four response options. Based on Levin et al. (1995) and Taylor et al. (1999), two questions measured subjective religiosity and one question measured performance of religious activities (Levin et al., 1995). To measure fear of dogs, the question was asked: "Are you afraid of dogs?" (yes/no). The binary variables for gender (with women as the reference group) and the fear of dogs were dummy coded before analysis.

Data Analysis

Missing values were completed by the mean of relevant items (excluding categorical variables). Since the data did not show a multivariate normal distribution, the bootstrap method (Byrne, 2001) was used (10,000 resamples). Confirmatory factor analysis (CFA) was performed to test the validity of the scales. We tested the reliability of the latent variables (WVOs, the fear of wolves, and wild boar, religiosity) by calculating Cronbach's alpha values. Notably, reliability could not be calculated for the INS since it only had one item. The hypotheses of the research were tested using structural equation modeling (SEM). Separate CFA and SEM models were created for both wolves and wild boar. The acceptability of the CFA and SEM models was examined with fit indices. Accordingly, the comparative fit index (CFI) > .90 and the root mean square error of approximation (RMSEA) < .08 indicated an acceptable fit (Bryne, 2001). In the SEM models, the direct effect of the variables on fear was examined. Since the same model was created for both animal species, fear of dogs was also included in the model for wild boar. Cases (17 in total) with missing values for gender and fear of dogs were removed before the SEM analysis. IBM-SPSS® and AMOS (version 23) were used to analyze the data.

Research Results

Results of Confirmatory Factor Analyses

As mentioned, two separate measurement models were developed for wolves and wild boar. First, we conducted CFA for both animals separately. Two items ("Hunting does not respect the lives of animals" and "Hunting is cruel and inhumane to the animals") were removed from the domination scale because of low factor loading, and a high standardized residual. By considering modification indices, theoretically justified error correlations (four in total) within the same latent constructs in the WVOs were added. Finally, the fit indices of the models with only latent variables (WVOs, religiosity, fear) were acceptable for both wolves ($\chi^2(df)$ = 572.888(199), p < .001, CFI = .927, RMSEA = .054; Bollen-Stine bootstrap p [BSp] < .001) and wild boar ($\chi^2(df)$ = 569.284(199), p < .001, CFI = .928, RMSEA = .053; BSp < .001). Standardized factor loadings of the scales were found to be above .40. Cronbach's alpha value was .82 for domination, .85 for mutualism, .84 for religiosity, .73 for fear of wolves, and .75 for fear of wild boar. The corrected item-total correlations of all items were > .40. The latent variables showed correlations with each other less than .90. Thus, discriminant validity was confirmed (Kline, 2011).

According to Table 1, students were generally afraid of wolves and wild boar. In addition, the sample was highly religious. Mutualistic orientations were, on average, higher than domination orientations.

Table 1
Descriptive Information

Construct	N	Min.	Max.	M	SD	Mdn
Domination	656	1.00	4.63	2.65	0.73	2.63
Mutualism	656	1.33	5.00	3.55	0.69	3.56
Religiosity	656	1.00	4.00	2.95	0.70	3.00
Fear of wolves	656	1.00	5.00	2.98	1.15	3.00
Fear of wild boar	656	1.00	5.00	3.36	1.19	3.50
Inclusion with nature in self	656	1.00	7.00	4.37	1.72	4.00
Fear of dogs	647	0	1	0.35	0.48	
Gender (men)	648	0	1	0.28	0.45	

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After the validity and reliability of the latent variables were ensured, measurement models, including gender, INS, and fear of dogs, were created. The models showed an acceptable fit for wolves ($\chi^2(df)$ = 736.568(253), p < .001, CFI = .916, RMSEA = .055, BSp < 0.001) and wild boar ($\chi^2(df)$ = 758.410(253), p < .001, CFI = .912, RMSEA = .056, BSp < .001). Table 2 shows the correlations between fear and the other variables. There was a strong correlation between the fear of dogs and the fear of wolves and wild boar. There was also a stronger correlation between religiosity and fear of wild boar than fear of wolves. In addition, mutualism, INS, and the male gender were negatively correlated with the fear of both animals.

Table 2
*Amos Correlations Between Fear and the Predictors*

	Gender	Mutualism	Domination	Inclusion with nature in self	Religiosity	Fear of dogs
Fear of wolves	-.39**	-.41**	.09	-.38**	.27**	.52**
Fear of wild boar	-.31**	-.32**	.12	-.32**	.36**	.46**

Bootstrap *p* values are presented (*: *p* < .01, **: *p* < .001)

Results of Structural Equation Models

Although domination was not significantly correlated with the fear of both animals, it was included in the model to control for its effect. The fit of SEM was acceptable for wolves ($\chi^2(df)$ = 736.568(253), p < .001, CFI = .916, RMSEA = .055; BSp < .001) and wild boar ($\chi^2(df)$ = 758.410(253), p < .001, CFI = .912; RMSEA = .056; BSp < .001). Fear of dogs positively predicted fear of wolves (β = .33, p < .001) and fear of wild boar (β = .28 p < .001). Mutualism (β = -.22, p < .01) negatively predicted fear of wolves, but it was not a significant predictor of fear of wild boar. On the other hand, domination had no predictive power over the fear of either animal. INS negatively predicted fear of wolves (β = -.15, p < .001) and fear of wild boar (β = -.16, p < .001), while religiosity was a positive predictor of fear of wild boar (β = .20, p < .01), although it did not predict fear of wolves. Finally, gender negatively predicted fear of wolves (β = -.31, p < .001) and fear of wild boars (β = -.21, p < .001), saying that females were more afraid. The explained variance was 46% for fear of wolves and 36% for fear of wild boar.

Figure 1
The Structural Equation Modeling Results for Wolves and Wild Boar
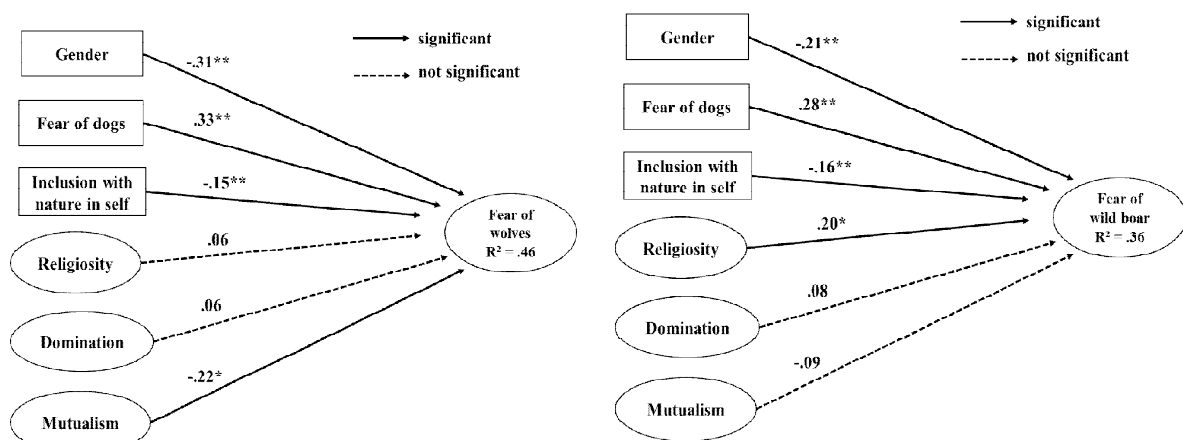
Note. Standardized values (β) are presented. Bootstrap p values are presented (*: *p* < .01, **: *p* < .001). The covariances are not shown so that complexity is reduced.

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Discussion

This research has shown that the influence of WVOs on fear of wildlife can vary by species. Domination was not associated with fear of either animal. Thus, H_1 was not supported. Considering that hunting beliefs and appropriate use beliefs can have opposing effects on negative emotions toward wolves (Landon et al., 2020), they may have neutralized each other's effects. Therefore, the effects of the appropriate use and hunting dimensions of domination on fear should be examined separately in the future. On the other hand, consistent with the theory of WVOs (Manfredo et al., 2009), students with a mutualistic orientation are less afraid of wolves. Mutualism negatively correlated with both fear of wolves and wild boars, but this association was significant for wolves. Therefore, H_2 was only supported for wolves. However, the finding that a mutualistic orientation does not predict the fear of wild boar may be explained by the influence of religion. As we mentioned above, there are prohibitions and a negative view toward pigs in the Islamic faith. Therefore, the mutualistic beliefs of Muslim students may not pertain to this animal. Seeing wild boar as evil and even dirty animals can induce fear and even increase the perception of their danger; it has been claimed that disgust plays a role in the fear of animals (Armfield, 2006). The beliefs that wild boars are dangerous, dirty, and associated with sin may influence each other synergistically. Supporting this claim, religiosity predicted the fear of wild boar but not the fear of wolves, so H_3 was supported only for wild boar. The corresponding finding regarding wolves is consistent with studies that reported no relationship between religiosity and negative attitudes toward particular wildlife species (Castillo-Huitrón et al., 2024). In addition, Bhatia et al. (2017) also found no significant relation between religiosity and attitudes toward wolves in Muslim communities. Regarding fear of wild boar, the responses to the item "When I think about the animal's presence, I already have a queasy feeling", in particular, may have reflected not only fear of but also a negative attitude toward wild boar due to the association of the animal with sin and uncleanliness. The findings from the same sample with this study showed widespread disgust and anger among students toward the wild boar (Dervişoğlu & Menzel, 2024b). Negative beliefs about wildlife species stemming from religion or myths can influence negative attitudes toward them, as shown by Musila et al.'s (2018) and Prokop et al.'s (2009) studies regarding bats.

Supporting H_4, the more students felt connected to nature, the less fear they felt toward wolves and wild boar. This indicates an emotional schema that includes cognitions like thought and memory: Students who are strongly connected with nature may have a more positive image and memory cognitions of wolves or wild boars. Therefore, biophilia (Kellert & Wilson, 1993) may serve as a filter for negative emotions toward wildlife. Alternatively, these people may have more knowledge about animals because they consume more books, magazines, or documentaries about nature since knowledge has been found to reduce the fear of large carnivores (Randler et al., 2020; Oražem et al., 2021).

This study showed that students with a fear of dogs are more afraid of wolves than those without a fear of dogs, so H_5 was supported. On the other hand, the finding that students who are afraid of dogs are also more afraid of wild boars may be explained by a more general fear of large mammals, which is suggested to have evolutionary origins (Prokop et al., 2021, 2024).

We found that female students are more afraid of both wolves and wild boar than male students, so H_6 was supported for both animals. This is usually explained as an evolutionary adaptation that arose because women were more vulnerable to lethal attacks from wild animals (Prokop & Fančovičová, 2013; Røskaft et al., 2003). In this regard, Prokop and Fančovičová (2013) report that women have higher levels of disgust, fear, and danger perceptions of animals which pose a threat of physical harm or illness. Some of the reported fears of wild boar may also be related to disease transmission, as the animal is seen as dirty due to the influence of Islamic belief.

In this study, students were more afraid of wild boars than wolves. However, the data from the same sample in this study showed that students reported a stronger fear of wolves than wild boars when they imagined the animal (Dervişoğlu & Menzel, 2024b). One explanation could be that in the emotion scale used in this paper, the students were asked about the emotions they felt due to the presence of animals, and wolves are not frequently present in the vicinity of humans in Turkey.

Conclusions and Implications

This research shows that the fear of wolves is influenced by worldviews pertaining to human-wildlife relationships. Specifically, mutualistic beliefs seem to reduce the fear of wolves, but not of wild boar. The relationship between WVOs and the fear of various wildlife species should be examined in more detail in the future. Different

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objects of fear should also be considered (Frank et al., 2015). For example, different results may occur in terms of fear of attack on humans and fear of attack on livestock.

Research shows that the relationship between religion, emotions, and attitudes toward wildlife is quite complex. This study indicates that examining religion-based specific beliefs about wildlife species will yield more accurate results, rather than the general effect of religiosity or religiose affiliations on the emotions toward specific wildlife species. This is because religions include a variety of beliefs. Hence, in future, those elements of Islam which trigger fear of wild boar should be examined in more detail in Turkey and other Muslim societies, particularly through qualitative research.

This study indicates that discourses and messages aimed at encouraging a mutualistic orientation are effective in reducing the fear of large carnivores. Furthermore, strengthening people's connection with nature could be effective in reducing fear of large carnivores.

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Disclosure Statement

There are no conflicts of interest to declare.

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