People and bears: Evaluating public attitudes to foster human–carnivore coexistence in Slovakia

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Abstract:
The brown bear (herein, bear) *Ursus arctos* has been exhibiting an increasing population trend in Slovakia. This rise in population has led to human–bear conflicts (HBCs), mainly in the form of livestock predation and agricultural damage. In this study, we provide one of the first assessments of public attitudes toward the presence of bears in Slovakia to suggest management and conservation strategies. From January to March 2022, we randomly distributed 1,000 anonymous electronic questionnaires among people living in areas with either bear presence or absence within Slovakia. Data were subsequently analyzed using Cumulative Link Models. Women, despite showing greater fear of bears than men, were more sensitive to the need for mitigating HBCs. Older and less–educated respondents predominantly exhibited a negative attitude toward the presence of bears compared to younger and more–educated individuals. Respondents living in areas with bear occurrence exhibited lower trust in organizations responsible for bear management, demonstrated more negative attitudes toward bear presence, and were more in favor of lethal control or translocation of problematic individuals. Educational activities that explain the important role carnivores play in maintaining ecosystem functionality, as well as their economic benefits through tourism, should be emphasized to enhance bear acceptance, particularly among individuals residing in areas with permanent bear populations. Furthermore, the engagement of scientists on social media is crucial to prevent negative portrayals of bears, which could influence human attitudes toward their presence. Conservation campaigns should provide guidance on recommended human behaviors (e.g., proper waste disposal) to minimize the attraction of bears to urban areas and strategies for reducing the risk of human–bear encounters in natural settings.

Keywords: large carnivores, fear of predators, human–bear conflict, public perceptions.

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Running title: Human–bear conflict in Slovakia.

Abstract

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respondents predominantly exhibited a negative attitude toward the presence of bears compared to younger and more–educated individuals. Respondents living in areas with bear occurrence exhibited lower trust in organizations responsible for bear management, demonstrated more negative attitudes toward bear presence, and were more in favor of lethal control or translocation of problematic individuals. Educational activities that explain the important role carnivores play in maintaining ecosystem functionality, as well as their economic benefits through tourism, should be emphasized to enhance bear acceptance, particularly among individuals residing in areas with permanent bear populations. Furthermore, the engagement of scientists on social media is crucial to prevent negative portrayals of bears, which could influence human attitudes toward their presence. Conservation campaigns should provide guidance on recommended human behaviors (e.g., proper waste disposal) to minimize the attraction of bears to urban areas and strategies for reducing the risk of human–bear encounters in natural settings.

Keywords: Fear of carnivores, human–bear conflict, large carnivores, public attitudes.

Declarations

Ethics approval

Ethical approval was obtained by the Ethical Committee of the Department of Agrifood, Environmental and Animal Sciences, University of Udine (Protocol Number 0005095).

Consent to participate

All respondents gave their consent to participate in the survey.

Consent for publication

All respondents gave their consent to publish the contents of the survey.

CRediT authorship contribution statement

Marcello Franchini: Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Juraj Švajda:** Conceptualization, Data curation, Investigation, Project administration, Resources, Supervision, Validation, Visualization, Writing – review & editing. **Marcel Uhrin:** Investigation, Validation, Visualization, Writing – review & editing. **Pavol Prokop:** Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Conflict of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data are available from the corresponding author on reasonable request.

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Introduction

Human attitudes toward the presence of large carnivores (herein, carnivores) in shared landscapes can range from admiration and fascination to dislike and a desire for lethal control (Dressel et al., 2015; Franchini et al., 2021; Slagle et al., 2017). These attitudes are influenced by various factors such as value orientations (Manfredo et al. 2009), direct experiences with carnivores in the form of economic losses on human activities (e.g., Augugliaro et al. 2020; Franchini et al. 2025; Guerisoli et al. 2017), perceived damages to human activities (e.g., Ambarlı, 2016; Franchini et al., 2021; Herrero et al., 2021), and psychological impact that carnivores may exert on people (Pohja-Mykrä 2016, 2017).

The brown bear (herein, bear) *Ursus arctos* is a carnivore species which primarily comes into conflict with humans through damages to agro–livestock activities (e.g., Naves et al., 2018; Tosi et al., 2015) and, although rare, attacks on humans (Bombieri et al., 2019, 2023; Herrero, 2002). Factors such as real or perceived threats to human lives or activities (Kaczensky et al., 2004; Prokop and Fančovičová, 2010; Wechselberger et al., 2005) broadly impact public attitudes toward the presence of bears. However, despite damages to human activities (e.g., Naves et al., 2018; Tosi et al., 2015) and/or sporadic attacks on humans (Bombieri et al., 2019, 2023; Herrero, 2002), attitudes toward the presence of bears are generally more favourable than toward other carnivores (Dressel et al., 2015; Røskaft et al., 2003). Nevertheless, certain interest groups like hunters, livestock owners, and residents of areas with permanent bear occurrence, typically do not support bear conservation (Franchini et al., 2021; Kaczensky et al., 2004; Røskaft et al., 2007).

The bear is protected not only by national legislations (e.g., Nature and Landscape Protection Act), but also by European ('Habitat' Directive 92/43/EEC) and international legislations (Bern Convention, CITES). According to the bear management plan realized in Slovakia, Sites of Community Importance, i.e., Sites whose geomorphological and ecological features significantly contribute to the maintenance or restoration of a natural habitat or a species (European Commission

Online Platform – https://environment.ec.europa.eu/index_en), have been identified to guarantee the effective protection of the species and its main habitats (Antal et al., 2016). In Slovakia, and especially in the High Tatras which represents the most important area dedicated to bear protection, the once declining bear population has been slowly recovering thanks to state laws and hunting regulations. Recent genetic analyses suggests that the bear population has grown from 20–60 individuals estimated in 1932, to 1000–1500 individuals so far (Paule et al., 2015). The Slovak public is divided between those supporting and those opposing bear conservation, particularly in areas where bears kill livestock (Rigg et al., 2011). From 2000 to 2016, fifty–four incidents between bears and humans were recorded (Haring, 2018). Although the vast majority were non–fatal, the media emphasized the negative aspects of bears' presence in the country. Furthermore, the increasing human–bear conflicts (HBCs – mainly damages to livestock, agriculture, and/or beehives) over bear management likely due to the continuously growing bear population, along with a fatal bear attack on a 57–year–old man in June 2021, have contributed to worsening the already tense situation. Given the existing conflictive situation, assessing public attitudes toward the presence of bears in Slovakia assumes paramount importance to delineate the most effective management and conservation strategies aimed at reducing the magnitude of HBCs over bear management.

To the best of our knowledge and based on the available literature, this study represents one of the first assessments of human attitudes toward the presence of bears in Slovakia. Although attitudes toward the presence of carnivores are partially mediated by value orientations (Manfredo et al. 2009), previous research has shown that women generally show greater fear of carnivores than men (De Pinho et al. 2014; Prokop and Fančovičová, 2010; Suryawanshi et al., 2014), and younger individuals generally show a more positive attitude than older ones (Dressel et al., 2015; Suryawanshi et al., 2014; Vaske et al., 2022a). Moreover, people with a higher level of formal education are more inclined to accept the presence of carnivores than those having lower level of education (Bhatia et al., 2017; Smith et al., 2014; Suryawanshi et al., 2014), while people living in areas with permanent carnivores' occurrence have in general a more negative attitude toward their presence because of the

real or perceived risk of damages (Røskaft et al., 2007; Zimmermann et al., 2001). Therefore, we hypothesized that factors such as sex, age, level of education, and living area (bear presence/absence) significantly shape attitudes toward the presence of bears. Specifically, we expected to observe: (*i*) women exhibiting greater concerns and self–perceived fear of bears compared to men; (*ii*) an inverse relationship between increasing age and a positive attitude toward the presence of bears; (*iii*) more–educated respondents having a more positive attitude toward the presence of bears than those with less education; and (*iv*) respondents living in areas with permanent bear occurrence displaying a more negative attitude toward the presence of bears compared to those living in areas where bears are absent.

Materials and methods

Questionnaire structure

From January to March 2022, we employed a purposive sampling approach, distributing 1,000 anonymous electronic questionnaires via the Qualtrics platform through social media groups, community networks, and interest–based platforms targeting individuals in both bear–present and bear–absent regions (Fig. 1), including the High Tatras, the most important area dedicated to bear protection in Slovakia (Fig. 2). The questionnaire was adopted and modified based on previous research (e.g., Ambarlı, 2016; Glikman et al., 2019; Majić et al., 2011; Piédallu et al., 2016), self–administered online, and no respondents were recruited in person. The questionnaire included 34 questions divided into different sections designed to address: (1) respondents' attitudes toward the presence of bears in the High Tatras and Slovakia more broadly; (2) their level of knowledge and personal views on various aspects of bear presence, such as their feelings about bears, opinions on bears' ecological role and protection, and views on the management of problematic individuals; (3) the situation in the High Tatras regarding human–bear negative interactions, including opinions on factors leading to HBCs, observations of increased bear confidence, and evaluations of the

effectiveness of prevention measures and Slovak organizations in managing the bear situation; and (4) demographic and background information (e.g., sex, age, level of education, residence in areas where bears are present or absent). We implemented a 7–point Likert scale questionnaire (i.e., 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neutral, 5 = somewhat agree, 6 = agree, 7 = strongly agree) to allow respondents to express their opinions and feelings with greater nuance. However, for the purposes of the analysis, we consolidated the scale into three categories: 1 = disagree (combining strongly disagree, disagree, and somewhat disagree), 2 = neutral, and 3 = agree (combining somewhat agree, agree, and strongly agree). This decision was made to reduce response variability and ensure more robust parameter estimates (Burnham and Anderson, 2002; Bolker, 2008).

All respondents gave their consent to participate in the questionnaire. They were informed that the information collected would remain strictly confidential and be used solely for research purposes by the research team. The questionnaire was designed to be completed in approximately 15 minutes (see Supplementary material 1).

Data analysis

To predict the Likert scale ordinal responses, we fitted Cumulative Link Models (CLMs) using the R package 'ordinal' (Christensen, 2015), which is commonly used in human–dimension studies to assess attitudes toward carnivores' presence (e.g., Augugliaro et al., 2020; Hanson et al., 2019). Given the large number of findings presented (see *Results*), generating plots to illustrate the results could have compromised the overall clarity of our work. Therefore, we adopted the approach proposed by Augugliaro et al. (2020) and Hanson et al. (2019), calculating the mean response rate for each significant covariate or predictor. This approach enabled us to better interpret the 'direction' of the ordinal dependent variable based on statistical significance.

The full model included independent variables such as sex, age, level of education, and living area (bear or no–bear area). Model simplification was performed based on the *principle of parsimony*, which involves removing non-significant explanatory variables starting from the full model.

Multicollinearity among covariates was checked through the Variance Inflation Factor (VIF) using the 'car' R package (Fox and Weisberg, 2019), following the assumptions of CLMs, i.e. (1) presence of an ordinal dependent variable, (2) presence of continuous, categorical or ordinal covariates, (3) absence of multicollinearity among covariates, (4) proportional odds. We considered VIF ≥ 3 as a threshold value to define those covariates presenting collinearity issues (Hair, 2014). The proportional odds assumption requires that the coefficients between each pair of outcome categories remain consistent, meaning there should be the same slope but different intercepts for outcome categories within a single model (Christensen 2016, 2021). To verify if this assumption was met, we compared the full model with a multinomial logit model using the 'nnet' R package (Ripley and Venables, 2022). We then used the likelihood ratio chi-square test to test the null hypothesis of no difference in the coefficients (Hanson et al., 2019). If the assumption was violated (i.e., *p*–value < 0.05), we addressed this by implementing both nominal and scale effects for the independent variables (Christensen 2016, 2021). The scale effect is used when the nominal effect alone is insufficient to relax the assumption and is generally considered a better approach because it is well defined for all values of the explanatory variables, regardless of the translocation and scaling of covariates (Christensen 2016, 2021). Additionally, scale effects often use fewer parameters, which can lead to more sensitive tests compared to nominal effects (Christensen 2016, 2021). For each question (response variable), the selection of the best model was based on Akaike's Information Criterion (AIC – Burnham and Anderson, 2002). In cases where models showed $\Delta AIC < 2$ (i.e., considered as competitors of the best model), we performed model averaging by calculating Akaike's weights (Burnham and Anderson, 2002).

Statistical models were developed based on the topics' subdivision outlined in Supplementary material 1. However, to improve clarity, we have presented and discussed the results according to the involved categories, i.e., sex, age, level of education, and respondents living in bear or non–bear area. Additionally, given the large number of responses, we have only presented and discussed the results obtained from the best models (see *Results* and *Discussion*).

Statistical analyses were conducted using the Software R (v. 4.3 – R Core Team, 2023) and the level of significance (i.e., *alpha*) was set at 0.05.

Results

Demographic and background information

Overall, 470 responses were obtained. However, in the analysis were included only those respondents (n = 309) who provided their personal information. The age of the interviewed spanned from 18 to 78 years old (Tab. 1).

Sex differences

Men, more than women, perceived the presence of bears in the High Tatras as a positive thing. The number of positive responses was in fact significantly higher (Tab. 2) in men (n = 88, 78.57%, mean response rate = 2.71) than in women (n = 123, 62.44%, mean response rate = 2.51). Moreover, compared to women, men mostly disagreed about (*i*) the effectiveness of the fire brigade in managing the bear situation, i.e., the number of disagreements was significantly higher (Tab. 8) in men (n = 51, 45.53%, mean response rate = 1.72) than in women (n = 69, 35.02%, mean response rate = 1.93), and (*ii*) the effectiveness of moving containers closer to the city center/village to reduce bear incursions and damages, i.e., the number of disagreements was significantly higher (Tab. 9) in men (n = 46, 41.07%, mean response rate = 2.00) than in women (n = 54, 27.41%, mean response rate = 2.24).

Women, compared to men, reported to be more scared of bears as the number of answers reporting fear was significantly higher (Tab. 2) in women (n = 150, 76.14%, mean response rate = 2.60) than in men (n = 71, 63.39%, mean response rate = 2.37). Furthermore, compared to men, women mostly agreed regarding: (*i*) the presence of tourists in nature as the main driver of HBCs, i.e., the number of agreements was significantly higher (Tab. 4) in women (n = 98, 49.75%, mean response rate = 2.05) than in men (n = 40, 35.71%, mean response rate = 1.80), (*ii*) the possibility that HBCs arose because of the disruption of the bear population structure due to hunting, i.e., the number

of agreements was significantly higher (Tab. 4) in women (n = 77, 39.09%, mean response rate = 1.91) than in men (n = 39, 34.82%, mean response rate = 1.76), (*iii*) the effectiveness of the Animal Welfare Organization in managing the bear situation, i.e., the number of agreements was significantly higher (Tab. 8) in women (n = 155, 78.68%, mean response rate = 2.67) than in men (n = 72, 64.28%, mean response rate = 2.43), and (*iv*) the effectiveness of translocating bears showing confident behaviours into less human–populated areas to reduce the degree of HBCs in the High Tatras, i.e., the number of agreements was significantly higher (Tab. 9) in women (n = 139, 70.56%, mean response rate = 2.56) than in men (n = 68, 60.71%, mean response rate = 2.35).

No significant difference was found between sexes in terms of opinions regarding the efficacy of both the NP Administration resp. State Nature Protection and the brown bear intervention team in managing the bear situation (Tab. 8).

The influence of age

With increasing age, the odds to find respondents significantly increased in agreement about: (*i*) the possibility that change in bears' behaviour is the main issue in the insurgence of HBCs (Tab. 4), (*ii*) the effectiveness of killing food–conditioned bears to reduce HBCs in the High Tatras (Tab. 9), and (*iii*) the effectiveness of translocating problematic bears to captivity to reduce HBCs in the High Tatras (Tab. 9).

Conversely, with increasing age, the odds to find respondents significantly decreased in agreement about: (*i*) the possibility that baits used by hunters for hunting purposes is the main problem driving HBCs (Tab. 4), and (*ii*) the implementation of artificial feeding points in the forest to reduce bear damages in the High Tatras (Tab. 9).

No significant association with age was instead observed concerning: (*i*) the potential effectiveness of realizing bear–resistant containers to reduce bear incursions into human settlements in the High Tatras (Tab. 9), (*ii*) the presence of crop resources as the main factor leading to the insurgence of HBCs (Tab. 4), (*iii*) the perceptions regarding the efficacy of the brown bear

intervention team in managing the bear situation (Tab. 8), (*iv*) the perceptions that bear population growth is among the primary drivers of HBCs (Tab. 4), and (*v*) the potential effectiveness of installing electric fences around containers to reduce bear incursions into human settlements in the High Tatras (Tab. 9).

The influence of education

Respondents with higher level of education, compared to those with less education: (*i*) showed a more positive attitudes toward the presence of bears in Slovakia, i.e., the number of positive responses was significantly higher (Tab. 2) in more–educated respondents (n = 103, 72.54%, mean response rate = 2.65) than in less–educated ones (n = 103, 61.68%, mean response rate = 2.52), (*ii*) mostly disagreed about the effectiveness of increasing the bear shooting quota to reduce HBCs in the High Tatras, i.e., the number of disagreements was significantly higher (Tab. 9) in more–educated respondents (n = 80, 56.34%, mean response rate = 1.73) than in less–educated ones (n = 89, 53.29%, mean response rate = 1.79), and (*iii*) mostly disagreed about the effectiveness of translocating problematic bears to captivity to reduce HBCs in the High Tatras, i.e., the number of disagreements was significantly higher (Tab. 9) in more–educated respondents (n = 80, 29.58%, mean response rate = 1.73) than in less–educated ones (n = 76, 45.51%, mean response rate = 1.90).

The fear of bears was also associated to the level of education. Less–educated respondents showed significantly higher (Tab. 2) fear for bears (n = 131, 78.44%, mean response rate = 2.66) than more–educated ones (n = 90, 63.38%, mean response rate = 2.35). Moreover, compared to more–educated respondents, less–educated ones: (*i*) mostly agreed about the possibility that change in bears' behaviour is the main problem involved in the insurgence of HBCs in the High Tatras, i.e., the number of agreements was significantly higher (Tab. 4) in less–educated respondents (n = 79, 47.30%, mean response rate = 2.08) than in more–educated ones (n = 52, 36.62%, mean response rate = 1.81), and (*ii*) mostly agreed about the efficacy of the Slovak hunting association in managing the bear situation, i.e., the number of agreements was significantly higher (Tab. 8) in less–educated

respondents (n = 88, 52.69%, mean response rate = 2.26) than in more–educated ones (n = 61, 42.96%, mean response rate = 2.01).

No significant difference was found between more– and less–educated respondents in terms of opinions regarding (*i*) the existence of problems of human–bear coexistence in the High Tatras (Tab. 4), (*ii*) bear population growth as a primary driver of HBCs (Tab. 4), and (*iii*) the efficacy of the NP Administration resp. State Nature Protection in managing the bear situation in the High Tatras (Tab. 8).

Living in areas with bear occurrence

Compared to respondents living in areas with permanent bear occurrence, those living in areas where bears are absent mostly agreed about: (*i*) the effectiveness of the Animal Welfare Organization in managing the bear situation, i.e., the number of agreements was significantly higher (Tab. 8) among respondents living in areas where bears are absent (n = 174, 78.73%, mean response rate = 2.69) than among those living in areas with permanent bear occurrence (n = 52, 59.77%, mean response rate = 2.31), and (*ii*) the effectiveness of translocating bears showing confident behaviours into less human–populated areas to reduce the degree of HBCs in the High Tatras, i.e., the number of agreements was significantly higher (Tab. 9) among respondents living in areas where bears are absent (n = 156, 70.59%, mean response rate = 2.55) than among those living in areas with permanent bear occurrence (n = 50, 57.47%, mean response rate = 2.31).

Compared to respondents living in areas where bears are absent, those living in areas with permanent bear occurrence: (*i*) mostly agreed about the effectiveness to kill food–conditioned bears to reduce HBCs, i.e., the number of agreements was significantly higher (Tab. 9) among respondents living in areas with permanent bear occurrence (n = 26, 29.88%, mean response rate = 1.74) than among those living in areas where bears are absent (n = 33, 14.93%, mean response rate = 1.44), and (*ii*) mostly disagreed about the effectiveness of moving containers closer to the city center/village to reduce bear incursions and damages, i.e., the number of disagreements was significantly higher (Tab.

9) among respondents living in areas with permanent bear occurrence (n = 41, 47.13%, mean response rate = 1.92) than among those living in areas where bears are absent (n = 59, 26.70%, mean response rate = 2.24).

No significant difference was found between respondents living in areas of permanent bear occurrence and those living in areas where bears are absent in terms of opinions regarding: (*i*) the existence of problems of human–bear coexistence in the High Tatras (Tab. 4), (*ii*) the adequacy of the NP Administration resp. State Nature Protection in managing the bear situation in the High Tatras (Tab. 8), (*iii*) the efficacy of the brown bear intervention team in managing the bear situation (Tab. 8), and (*iv*) the effectiveness of realizing bear–resistant containers to reduce bear incursions into human settlements (Tab. 9).

Discussion

The findings obtained from this research showed that about two–thirds of the respondents positively perceived the presence of bears in the Slovakian High Tatras, while about one–third showed fear of them. At the same time, two–thirds of the respondents considered the human–bear coexistence in the High Tatras problematic and supported the culling of problematic bears to reduce their impact on human activities. However, only about one–third of respondents reported an increase in confident behaviours by bears in recent years. Respondent attitudes toward the presence of bears were thus not predominantly negative, indicating the potential for a positive shift in attitudes in the future (Ericsson and Heberlein, 2003).

Sex differences

We observed significant differences in attitudes toward the presence of bears between men and women. Women showed higher fear for bears than men, hence matching our initial hypothesis and the results obtained in other studies (e.g., De Pinho et al., 2014; Prokop and Fančovičová, 2010; Røskaft et al., 2003). Women, more so than men, also affirmed that bear incursions in human areas

have been increasing in recent years, and that bears cause consistent damages to human properties. These results may be driven by gender–specific fear for carnivores rather than by direct experiences (Kaltenborn et al., 2006; Prokop and Fančovičová, 2010). Investments in family care may lead women to express greater fear toward carnivores, as they may be particularly concerned for the safety of their offspring (Prokop and Fančovičová, 2010). Moreover, physical condition can also play a crucial role, as women in poor physical conditions may be more vulnerable to attacks by carnivores, potentially increasing both perceived and real risk (Røskaft et al., 2003; Treves and Naughton-Treves, 1999). A study conducted in Kenya by De Pinho et al. (2014) revealed that, although Maasai women are potentially less exposed to lion (*Panthera leo*) attacks than men, who instead more frequently confront predators while defending livestock and family, they tend to express greater fear toward lions. This heightened fear stems from a perceived sense of vulnerability and defencelessness, which makes women feel more at risk despite lower direct exposure. Under normal circumstances in Slovakia, the likelihood of encountering bears does not significantly differ between men and women. However, as highlighted by De Pinho et al. (2014), direct exposure alone does not necessarily shape attitudes toward the presence of large carnivores. Instead, other factors such as perceived risk, vulnerability, and socio–cultural roles, can play a more influential role in shaping gender–based attitudes, often leading to differing levels of fear or acceptance regardless of actual encounter rates.

Despite expressing greater fear of bears, women demonstrated heightened sensitivity to specific issues that could significantly contribute to mitigating HBCs. Compared to men, women were more likely to agree that HBCs are exacerbated by the high influx of tourists in natural areas and by the disruption of bear population structures due to hunting. These findings align with previous studies indicating women's general opposition to hunting (Codrow et al., 2022; Corradini et al., 2022; Espinosa and Jacobson, 2012), as well as their typically higher levels of empathy and more positive attitudes toward animals and their welfare (Herzog, 2007; Signal and Taylor, 2006). Our results also revealed that women placed greater trust in the Animal Welfare Organization and the fire brigade in managing bear–related situations, reflecting a stronger preference for non–lethal management

strategies. Moreover, women more frequently reported environmental concerns, confident bear behaviours, and rule violations compared to men (Liu, 2018; Shahab et al., 2022; Zelezny et al., 2000). Altogether, these insights suggest that women could play a pivotal role in shaping and promoting effective, non–lethal approaches to mitigating HBCs in the future.

The influence of age

In accordance with our initial hypothesis, the influence of age on attitudes toward the presence of bears was consistently negative across most measured domains. Older respondents exhibited greater fear of carnivores which, among all, may be attributed to their higher vulnerability to attacks and, consequently, poorer functional recovery from injuries (Boyd et al., 2004; Ostrovski et al., 2021; Røskaft et al., 2003). With advancing age, respondents increasingly disagreed with the preservation of bear populations and showed greater support for reducing bear populations through hunting and translocating problematic individuals to captivity. These findings align with those of previous studies (e.g., Ambarlı, 2016; Herrero et al., 2021; Vaske et al., 2022a), which have shown that perceived damages to private property, often associated with increasing age, are potentially associated to negative attitudes toward the presence of carnivores.

Ericsson and Heberlein (2003) suggested that negative attitudes toward the presence of carnivores among older respondents in Sweden were not due to a gradual change in attitudes but rather were influenced by the historical period in which these individuals were born, when attitudes toward the presence of carnivores were more pessimistic. Given that the bear population in Slovakia has only recently begun to recover, the return of this predator to areas where it had been absent for decades may come as a shock, particularly for elderly individuals, potentially driving their more negative attitudes toward the presence of the species. Additionally, social media plays a pivotal role in shaping public attitudes and opinions. While humans often have an instinctive fear of large carnivores, this negative attitude can be exacerbated by the way information is disseminated through these platforms (Nanni et al., 2020). Elderly individuals, paradoxically, often share media content

with a degree of distrust but still engage with it (Munyaka et al., 2022), making them more susceptible to misinformation compared to younger individuals (Pehlivanoglu et al., 2022). We believe that this susceptibility to misinformation among elderly individuals may contribute to exacerbating their negative attitudes toward the presence of bears.

The influence of education

In line with our initial hypothesis, respondents with higher levels of education exhibited lower fear of bears, expressed more favourable views on bear protection, and were more opposed to lethal control measures and the translocation of bears to captivity compared to those with lower levels of education. Additionally, more–educated respondents did not exhibit an exaggerated perception of the risks associated with a potential increase in HBCs in Slovakia and demonstrated greater trust in relevant organizations for managing the bear situation than their less–educated counterparts. Although higher levels of education are generally associated with more positive attitudes toward the presence of carnivores (e.g., Bhatia et al., 2017; Dressel et al., 2015; Smith et al., 2014), the mechanisms underlying this influence are still unclear. The question of why more–educated respondents show less fear of bears remains open. One possible explanation is that individuals with higher education levels are more informed about the conservation status of carnivores, which may enhance their tolerance and positive attitudes (Bhatia et al., 2017; Kleiven et al., 2004; Suryawanshi et al., 2014). Additionally, given their higher level of education, they are likely to be better informed about the actual risk posed by bears and more aware that attacks on humans are extremely rare, which may contribute to more tolerant and rational attitudes toward the presence of the species. Lastly, increased income of more–educated respondents often facilitates engagement in outdoor tourist activities (Richards et al., 2020; Untari et al., 2019) which, in turn, may be associated to reduced fear of carnivores (Johansson et al., 2016; Røskaft et al., 2003).

Living in areas with bear occurrence

Our findings confirm our initial hypothesis and the already reported more negative attitudes toward the presence of carnivores among respondents living in areas with permanent carnivores' occurrence (Røskaft et al., 2007; Zimmermann et al., 2001). Interestingly, these results were not significantly influenced by the higher self–perceived fear of bears among respondents living in these areas. We speculate that individuals residing in such areas may have a more nuanced understanding of the exaggerated perceptions of bears as threats to humans. Nevertheless, they still perceive these animals as real or potential threats to human activities, particularly in terms of livestock predations (e.g., Dressel et al., 2015; Franchini et al., 2021). As a result, they showed less tolerance toward them.

Research limitations

Our sample was not representative of the entire Slovak population, and no weighting procedures were applied. The geographic distribution of responses was uneven, with higher participation in urban areas such as Košice and Bratislava. While this limits the external validity of our findings, our study provides an initial exploratory insight into public perception of human–bear coexistence in Slovakia, which can inform future research employing systematic sampling methods. It is important to note that, unlike in North America, where representative sampling is a standard practice in human dimensions research (e.g., Manfredo et al. 2021; Vaske et al. 2022b), most European studies, including those used in meta–analyses (e.g., Dressel et al. 2015; Franchini et al. 2021), rely on non–systematic sampling, making comparisons between studies challenging. Thus, our findings should be interpreted as an exploratory contribution rather than as a population–wide assessment.

Conservation and management recommendations

At the time of data collection, the (High) Tatras National Park Administration had not yet been merged with the State Forests of the Park, and the bear intervention team (a division of State Nature Protection) had not been strengthened in terms of skills, technology, and financial resources.

Consequently, in relation to bear management, respondents might have selected organizations that, although seemingly less relevant, were often involved in resolving conflict situations in the field. Currently, the activities of the bear intervention team have significantly increased visibility.

Increasing intangible benefits and positive experiences are among the most effective strategies for fostering human tolerance toward bears and promoting coexistence between landholders and carnivores (Marino et al., 2021). Educational activities aimed at explaining the important role that carnivores play in maintaining the ecosystem structure and function, including their recreational values (García-Rodríguez et al., 2021; Giergizny et al., 2022; Hoeks et al., 2020), are still poorly addressed in Slovakia. Furthermore, emphasizing the economic benefits of bears through tourism (Glikman et al., 2019) should be highlighted to enhance bear acceptance, particularly among individuals residing in areas with permanent bear populations. Greater involvement of citizens, such as through citizen science initiatives, to gather data for identifying priority conservation areas for bear populations (Bonnet-Lebrun et al., 2020) should be considered. Additionally, developing a mobile application to monitor illegal activities (e.g., poaching) and issues related to improper waste management could be beneficial. Social media often presents a sensationalistic view of carnivores, so the engagement of scientists on these platforms is essential for effective carnivore conservation (Nanni et al., 2020). There is also potential for involving existing zoos, which, by combining knowledge, emotional engagement, and social context, can foster improved public awareness and care for nature, promote pro–environmental behaviours, and establish long–term connections between visitors and carnivores (Consorte-McCrea et al., 2019).

Lastly, improving the implementation of bear monitoring plans at a regional scale could substantially enhance the collection of detailed information on bear movements and spatial ecology (Pop et al., 2018). This data could be used to predict the likelihood of bear occurrences in various areas and assess the intensity of HBCs using methods such as species distribution models (Rojas-VeraPinto et al., 2022) and remote sensing indicators (Bautista et al., 2022). Species management often extends beyond administrative boundaries, and habitat suitability models can effectively

support large–scale and transboundary conservation efforts (Scharf and Fernández, 2018), as is the case for the High Tatras. Despite the considerable funding allocated to carnivores, including contributions from the European Union, more emphasis should be placed on measuring and reporting the effectiveness of implemented strategies (Oliveira et al., 2021).

In conclusion, most respondents hold a positive attitude of the presence of bears in Slovakia. This favourable view provides a constructive foundation for future efforts aimed at shifting the attitudes of certain interest groups, such as livestock owners and hunters (Franchini et al., 2021), toward bears. The engagement of scientists on social media assumes remarkable importance to avoid negative portraits of bears which have the potential to change human attitudes toward their presence. Conservationist campaigns should therefore be presented by media as initiatives that show how people can safely coexist with bears. These campaigns should provide guidance on recommended human behaviours (e.g., proper waste disposal) to minimize the attraction of bears to urban areas and strategies for reducing the risk of human–bear encounters in natural settings.

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718 **Table 1** – Characteristics of respondents.

719 Characteristics of the involved categories		n	%
720 Sex	Male	112	36.25
	Female	197	63.75
721 Age class	18–26	161	52.10
722	27–38	55	17.80
	39–52	60	19.42
723	53–78	33	10.68
724 Level of education	Primary/Secondary school	167	54.05
	University/College	142	45.95
725 Bear occurrence in the area	Present	87	28.16
	Absent	221	71.52

Table 2 – Results of the best cumulative link models (CLMs) summarizing the effect of the selected independent variables on respondent feelings about the presence of bears. Abbreviations: SE = standard error.

Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
(a) Which statement best describes your feelings about the presence of bears in Slovakia?	Sex	0.56	0.30	1.90	0.06
	Age	-0.02	0.01	-1.55	0.12
	Level of education	0.71	0.29	2.40	0.02
	Bear occurrence	0.95	0.74	1.29	0.20
(b) How do you consider the presence of bears in the High Tatras?	Sex	1.61	0.66	2.45	0.01
	Age	0.04	0.04	1.02	0.31
	Bear occurrence	0.50	0.92	0.54	0.59
(c) To what extent would you say you are scared of bears?	Sex	-0.61	0.26	-2.37	0.02
	Level of education	-0.78	0.26	-3.10	0.002

738 **Table 3** – Results of the best cumulative link models (CLMs) about the effect of the selected
739 independent variables on respondent views regarding different aspects involving the bear presence.
740 Abbreviations: SE = standard error.

741 Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
742 (a) What is your opinion regarding the protection of bears in Slovakia?	Age	-0.02	0.01	-2.12	0.03
743	Level of education	0.64	0.31	2.01	0.04
744 (b) Do you think it's useless to have a bear population in the High Tatras due to the presence of large populations in other European countries?	Sex	-0.34	0.37	-0.94	0.35
	Level of education	-1.09	0.43	-2.58	0.01
745	Bear occurrence	-0.11	0.40	-0.27	0.79
746 (c) Do you think that problematic bears should be translocated to another part of Slovakia?	Age	0.15	0.09	1.57	0.12
747 748					
749 (d) Do you think that problematic bears should be killed?	Sex	0.49	0.25	1.97	0.04
	Age	0.03	0.01	3.22	0.00
	Level of education	-0.65	0.24	-2.67	0.01
750 (e) Do you think that bear hunting should be allowed?	Age	0.02	0.01	1.96	0.04
751	Level of education	-0.44	0.24	-1.83	0.07
752 (f) Do you think that in areas in which bears and humans coexist, bear attacks on humans are common?	Level of education	-0.67	0.26	-2.57	0.01
753 754	Bear occurrence	-1.04	0.74	-1.40	0.16
755 (g) Do you think that bears cause consistent damages to human proprieties?	Sex	-0.51	0.23	-2.18	0.03
756 757					

758

Table 4 – Results of the best cumulative link models (CLMs) about the effect of the selected independent variables on respondent perceptions about human–bear coexistence in the High Tatras. Abbreviations: SE = standard error.

Response variable		Independent variable/s	Estimate	SE	z–value	*p*–value
(a) Do you think there is a problem of coexistence between bears and humans in the High Tatras?		Level of education	-0.46	0.25	-1.86	0.06
		Bear occurrence	1.04	0.64	1.63	0.10
(b) If you agree, you would say the problem is:	(1) Bear multiplication	Age	0.16	0.10	1.57	0.11
		Level of education	-1.10	0.83	-1.33	0.18
	(2) Change in bears' behaviour	Sex	-0.40	0.24	-1.66	0.09
		Age	0.02	0.009	2.03	0.02
		Level of education	-0.49	0.24	-2.04	0.04
	(3) Crop resources	Age	0.05	0.03	1.59	0.11
	(4) Presence of tourists in nature	Sex	-0.82	0.24	-3.45	< 0.001
	(5) Baits used by hunters for hunting purposes	Age	-0.02	0.01	-2.89	0.004
	(6) Disruption of bear population structure because of hunting	Sex	-0.50	0.24	-2.06	0.04
		Bear occurrence	-0.45	0.25	-1.79	0.07

Table 5 – Results of the best cumulative link models (CLMs) about the effect of the selected independent variables on bear damages in the High Tatras. Abbreviations: SE = standard error.

Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
(a) How would you define bear damages to homes in the High Tatras?	Sex	0.05	0.11	0.47	0.64
	Age	0.0003	0.01	0.05	0.96
	Level of education	0.06	0.11	0.56	0.58
	Bear occurrence	-0.11	0.14	-0.81	0.42
(b) How would you define bear damages to cars in the High Tatras?	Age	-0.006	0.004	-1.54	0.12
	Bear occurrence	0.22	0.13	1.67	0.10
(c) How would you define episodes referring to bear searching food in the proximity of human settlements in the High Tatras?	Sex	-0.04	0.08	-0.53	0.60
	Age	0.003	0.002	1.42	0.16
(d) How would you define episodes referring to bear damages to beehives in the High Tatras?	Age	-0.02	0.006	-3.40	< 0.001

Table 6 – Results of the best cumulative link models (CLMs) about the effect of the selected independent variables on bears' behaviour and population dynamics in the High Tatras. Abbreviations: SE = standard error.

Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
(a) Do you think that the number of bears increased in recent years?	Sex	-0.02	0.03	-0.58	0.56
	Age	-6.22E-05	0.002	-0.04	0.97
	Level of education	0.16	0.14	1.18	0.24
(b) Do you think that bears loss their shyness towards humans in recent years?	Sex	0.65	0.24	2.70	0.007
	Age	0.02	0.01	1.53	0.13
(c) Do you think that events referring to bear getting close to human areas have been increased in recent years?	Sex	0.31	0.11	2.76	0.006
	Level of education	0.10	0.11	0.89	0.37
	Bear occurrence	0.14	0.11	1.32	0.19

Table 7 – Results of the best cumulative link models (CLMs) about the effect of the selected independent variables on the effectiveness of mitigation measures to reduce bear damages in the High Tatras. Abbreviations: SE = standard error.

Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
(a) Do you consider appropriate the use of visual and auditory deterrents for bears?	Sex	0.34	0.47	0.73	0.47
	Age	-0.01	0.01	-0.96	0.33
	Bear occurrence	0.80	0.63	1.26	0.21
(b) Do you consider appropriate shooting bears to mitigate human–bear conflicts?	Level of education	-0.63	0.25	-2.52	0.01
	Bear occurrence	0.84	0.26	3.24	0.001
(c) Do you consider useful capturing and relocating bears to reduce bear damages to human activities?	Sex	-0.38	0.23	-1.65	0.10
	Age	0.04	0.009	4.30	< 0.001
	Level of education	-0.35	0.23	-1.52	0.13
(d) Do you consider useful increasing containers' security to mitigate bear damages?	Age	0.05	0.02	2.72	0.006

818 **Table 8** – Results of the best cumulative link models (CLMs) about the effect of the selected
819 independent variables on the effectiveness of the hunting associations involved in bear management
820 programs in the High Tatras. Abbreviations: SE = standard error.

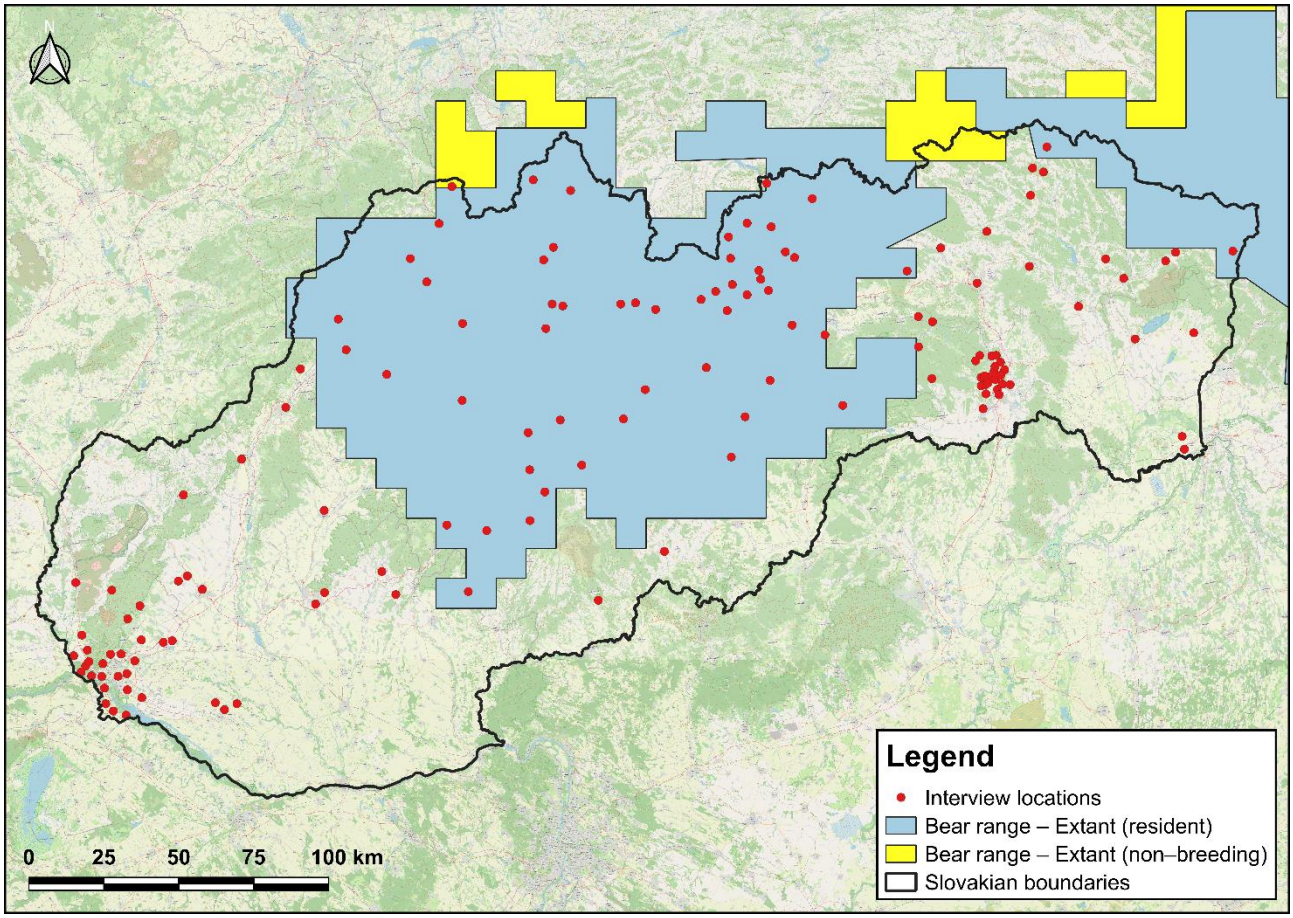
821 Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
822 823 824 (a) Do you consider the Slovak hunting association as effective in managing the bear situation?	Level of education	-0.71	0.23	-3.04	0.002
825 (b) Do you consider the Animal Welfare Organization as effective in managing the bear situation?	Sex	-0.62	0.27	-2.26	0.02
826	Level of education	0.54	0.29	1.88	0.06
827	Bear occurrence	-1.01	0.28	-3.52	< 0.001
828 (c) Do you consider the NP Administration resp. State Nature Protection as effective in managing the bear situation?	Sex	1.46	1.16	1.26	0.21
829	Level of education	0.51	0.35	1.44	0.15
	Bear occurrence	-0.60	0.35	-1.69	0.09
830 831 832 (d) Do you consider the fire brigade as effective in managing the bear situation?	Sex	-0.49	0.22	-2.22	0.03
833 (e) Do you consider the brown bear intervention team as effective in managing the bear situation?	Sex	0.13	0.79	0.17	0.87
834	Age	0.01	0.02	0.80	0.42
835	Bear occurrence	0.21	0.90	0.24	0.81

836

Table 9 – Results of the best cumulative link models (CLMs) about the best solutions aimed to solve the problems with bear in the High Tatras. Abbreviations: SE = standard error.

Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
(a) Do you think that killing food–conditioned bears is the best solution to reduce human–bear conflicts in the High Tatras?	Sex	-1.32	0.90	-1.46	0.14
	Age	0.05	0.01	3.53	< 0.001
	Level of education	-0.51	0.36	-1.42	0.15
	Bear occurrence	0.94	0.40	2.37	0.02
(b) Do you think that increasing the bear shooting quota is the best solution to reduce human–bear conflicts in the High Tatras?	Age	0.02	0.01	1.62	0.10
	Level of education	-0.48	0.24	-1.98	0.04
(c) Do you think that translocating confidential bears to less human populated areas is the best solution to reduce human–bear conflicts in the High Tatras?	Sex	-0.50	0.24	-2.03	0.04
	Bear occurrence	-0.61	0.26	-2.39	0.02
(d) Do you think that translocating problematic bears to captivity is the best solution to reduce human–bear conflicts in the High Tatras?	Age	0.03	0.01	3.40	< 0.001
	Level of education	-0.59	0.23	-2.52	0.01
(e) Do you think that creating artificial feeding points in the forest is the best solution to reduce bear damages in the High Tatras?	Sex	-0.50	0.28	-1.80	0.07
	Age	-0.03	0.01	-2.25	0.02
	Level of education	-0.38	0.28	-1.36	0.17
	Bear occurrence	-0.42	0.43	-0.97	0.33
(f) Do you think that installing electric fences around containers is the best solution to reduce bear incursions into human settlements in the High Tatras?	Age	0.01	0.01	1.35	0.18
(g) Do you think that replacing the actual containers with bear resistant ones is the best solution to reduce bear incursions into human settlements in the High Tatras?	Age	0.22	0.15	1.45	0.15
	Bear occurrence	-1.09	0.77	-1.42	0.16
(h) Do you think that moving containers closer to the city center/village is the best solution to reduce bear damages in the High Tatras?	Sex	-0.47	0.23	-2.05	0.04
	Bear occurrence	-0.65	0.25	-2.63	0.008

872 **Figure 1** – Interview locations and bear range of distribution in Slovakia (IUCN, 2017).



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874 **Figure 2 –** Location of the High Tatras in Slovakia (inset map).

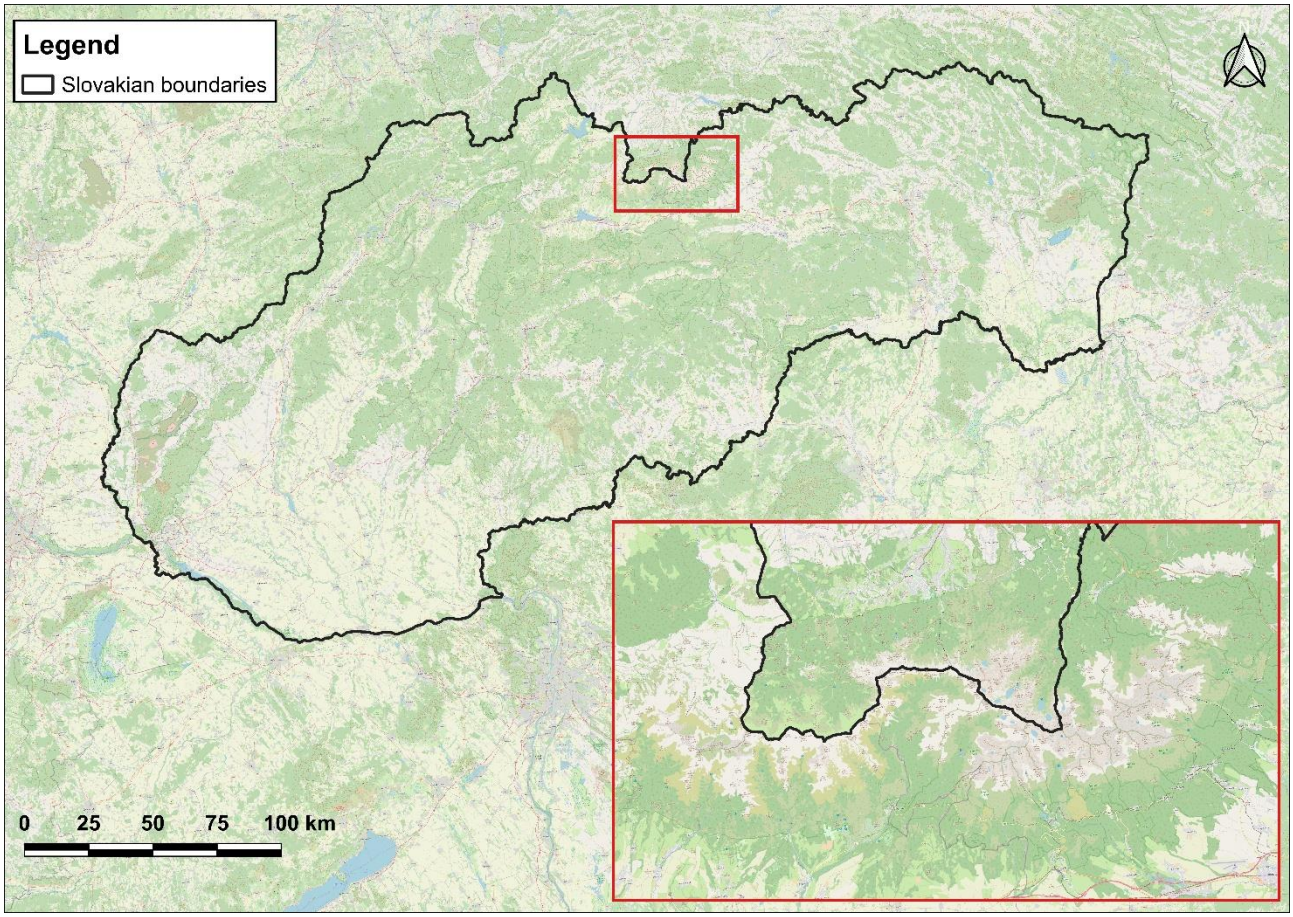

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Table 1 – Characteristics of respondents.

Characteristics of the involved categories		n	%
Sex	Male	112	36.25
	Female	197	63.75
Age class	18–26	161	52.10
	27–38	55	17.80
	39–52	60	19.42
	53–78	33	10.68
Level of education	Primary/Secondary school	167	54.05
	University/College	142	45.95
Bear occurrence in the area	Present	87	28.16
	Absent	221	71.52

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Table 2 – Results of the best cumulative link models (CLMs) summarizing the effect of the selected independent variables on respondent feelings about the presence of bears. Abbreviations: SE = standard error.

Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
(a) Which statement best describes your feelings about the presence of bears in Slovakia?	Sex	0.56	0.30	1.90	0.06
	Age	-0.02	0.01	-1.55	0.12
	Level of education	0.71	0.29	2.40	0.02
	Bear occurrence	0.95	0.74	1.29	0.20
(b) How do you consider the presence of bears in the High Tatras?	Sex	1.61	0.66	2.45	0.01
	Age	0.04	0.04	1.02	0.31
	Bear occurrence	0.50	0.92	0.54	0.59
(c) To what extent would you say you are scared of bears?	Sex	-0.61	0.26	-2.37	0.02
	Level of education	-0.78	0.26	-3.10	0.002

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Table 3 – Results of the best cumulative link models (CLMs) about the effect of the selected independent variables on respondent views regarding different aspects involving the bear presence. Abbreviations: SE = standard error.

Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
(a) What is your opinion regarding the protection of bears in Slovakia?	Age	-0.02	0.01	-2.12	0.03
	Level of education	0.64	0.31	2.01	0.04
(b) Do you think it's useless to have a bear population in the High Tatras due to the presence of large populations in other European countries?	Sex	-0.34	0.37	-0.94	0.35
	Level of education	-1.09	0.43	-2.58	0.01
	Bear occurrence	-0.11	0.40	-0.27	0.79
(c) Do you think that problematic bears should be translocated to another part of Slovakia?	Age	0.15	0.09	1.57	0.12
(d) Do you think that problematic bears should be killed?	Sex	0.49	0.25	1.97	0.04
	Age	0.03	0.01	3.22	0.00
	Level of education	-0.65	0.24	-2.67	0.01
(e) Do you think that bear hunting should be allowed?	Age	0.02	0.01	1.96	0.04
	Level of education	-0.44	0.24	-1.83	0.07
(f) Do you think that in areas in which bears and humans coexist, bear attacks on humans are common?	Level of education	-0.67	0.26	-2.57	0.01
	Bear occurrence	-1.04	0.74	-1.40	0.16
(g) Do you think that bears cause consistent damages to human proprieties?	Sex	-0.51	0.23	-2.18	0.03

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Table 4 – Results of the best cumulative link models (CLMs) about the effect of the selected independent variables on respondent perceptions about human–bear coexistence in the High Tatras. Abbreviations: SE = standard error.

Response variable		Independent variable/s	Estimate	SE	z–value	*p*–value
(a) Do you think there is a problem of coexistence between bears and humans in the High Tatras?		Level of education	-0.46	0.25	-1.86	0.06
		Bear occurrence	1.04	0.64	1.63	0.10
(b) If you agree, you would say the problem is:	(1) Bear multiplication	Age	0.16	0.10	1.57	0.11
		Level of education	-1.10	0.83	-1.33	0.18
	(2) Change in bears' behaviour	Sex	-0.40	0.24	-1.66	0.09
		Age	0.02	0.009	2.03	0.02
		Level of education	-0.49	0.24	-2.04	0.04
	(3) Crop resources	Age	0.05	0.03	1.59	0.11
	(4) Presence of tourists in nature	Sex	-0.82	0.24	-3.45	< 0.001
	(5) Baits used by hunters for hunting purposes	Age	-0.02	0.01	-2.89	0.004
	(6) Disruption of bear population structure because of hunting	Sex	-0.50	0.24	-2.06	0.04
		Bear occurrence	-0.45	0.25	-1.79	0.07

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Table 5 – Results of the best cumulative link models (CLMs) about the effect of the selected independent variables on bear damages in the High Tatras. Abbreviations: SE = standard error.

Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
(a) How would you define bear damages to homes in the High Tatras?	Sex	0.05	0.11	0.47	0.64
	Age	0.0003	0.01	0.05	0.96
	Level of education	0.06	0.11	0.56	0.58
	Bear occurrence	-0.11	0.14	-0.81	0.42
(b) How would you define bear damages to cars in the High Tatras?	Age	-0.006	0.004	-1.54	0.12
	Bear occurrence	0.22	0.13	1.67	0.10
(c) How would you define episodes referring to bear searching food in the proximity of human settlements in the High Tatras?	Sex	-0.04	0.08	-0.53	0.60
	Age	0.003	0.002	1.42	0.16
(d) How would you define episodes referring to bear damages to beehives in the High Tatras?	Age	-0.02	0.006	-3.40	< 0.001

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Table 6 – Results of the best cumulative link models (CLMs) about the effect of the selected independent variables on bears' behaviour and population dynamics in the High Tatras. Abbreviations: SE = standard error.

Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
(a) Do you think that the number of bears increased in recent years?	Sex	-0.02	0.03	-0.58	0.56
	Age	-6.22E-05	0.002	-0.04	0.97
	Level of education	0.16	0.14	1.18	0.24
(b) Do you think that bears loss their shyness towards humans in recent years?	Sex	0.65	0.24	2.70	0.007
	Age	0.02	0.01	1.53	0.13
(c) Do you think that events referring to bear getting close to human areas have been increased in recent years?	Sex	0.31	0.11	2.76	0.006
	Level of education	0.10	0.11	0.89	0.37
	Bear occurrence	0.14	0.11	1.32	0.19

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Table 7 – Results of the best cumulative link models (CLMs) about the effect of the selected independent variables on the effectiveness of mitigation measures to reduce bear damages in the High Tatras. Abbreviations: SE = standard error.

Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
(a) Do you consider appropriate the use of visual and auditory deterrents for bears?	Sex	0.34	0.47	0.73	0.47
	Age	-0.01	0.01	-0.96	0.33
	Bear occurrence	0.80	0.63	1.26	0.21
(b) Do you consider appropriate shooting bears to mitigate human–bear conflicts?	Level of education	-0.63	0.25	-2.52	0.01
	Bear occurrence	0.84	0.26	3.24	0.001
(c) Do you consider useful capturing and relocating bears to reduce bear damages to human activities?	Sex	-0.38	0.23	-1.65	0.10
	Age	0.04	0.009	4.30	< 0.001
	Level of education	-0.35	0.23	-1.52	0.13
(d) Do you consider useful increasing containers' security to mitigate bear damages?	Age	0.05	0.02	2.72	0.006

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Table 8 – Results of the best cumulative link models (CLMs) about the effect of the selected independent variables on the effectiveness of the hunting associations involved in bear management programs in the High Tatras. Abbreviations: SE = standard error.

Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
(a) Do you consider the Slovak hunting association as effective in managing the bear situation?	Level of education	-0.71	0.23	-3.04	0.002
(b) Do you consider the Animal Welfare Organization as effective in managing the bear situation?	Sex	-0.62	0.27	-2.26	0.02
	Level of education	0.54	0.29	1.88	0.06
	Bear occurrence	-1.01	0.28	-3.52	< 0.001
(c) Do you consider the NP Administration resp. State Nature Protection as effective in managing the bear situation?	Sex	1.46	1.16	1.26	0.21
	Level of education	0.51	0.35	1.44	0.15
	Bear occurrence	-0.60	0.35	-1.69	0.09
(d) Do you consider the fire brigade as effective in managing the bear situation?	Sex	-0.49	0.22	-2.22	0.03
(e) Do you consider the brown bear intervention team as effective in managing the bear situation?	Sex	0.13	0.79	0.17	0.87
	Age	0.01	0.02	0.80	0.42
	Bear occurrence	0.21	0.90	0.24	0.81

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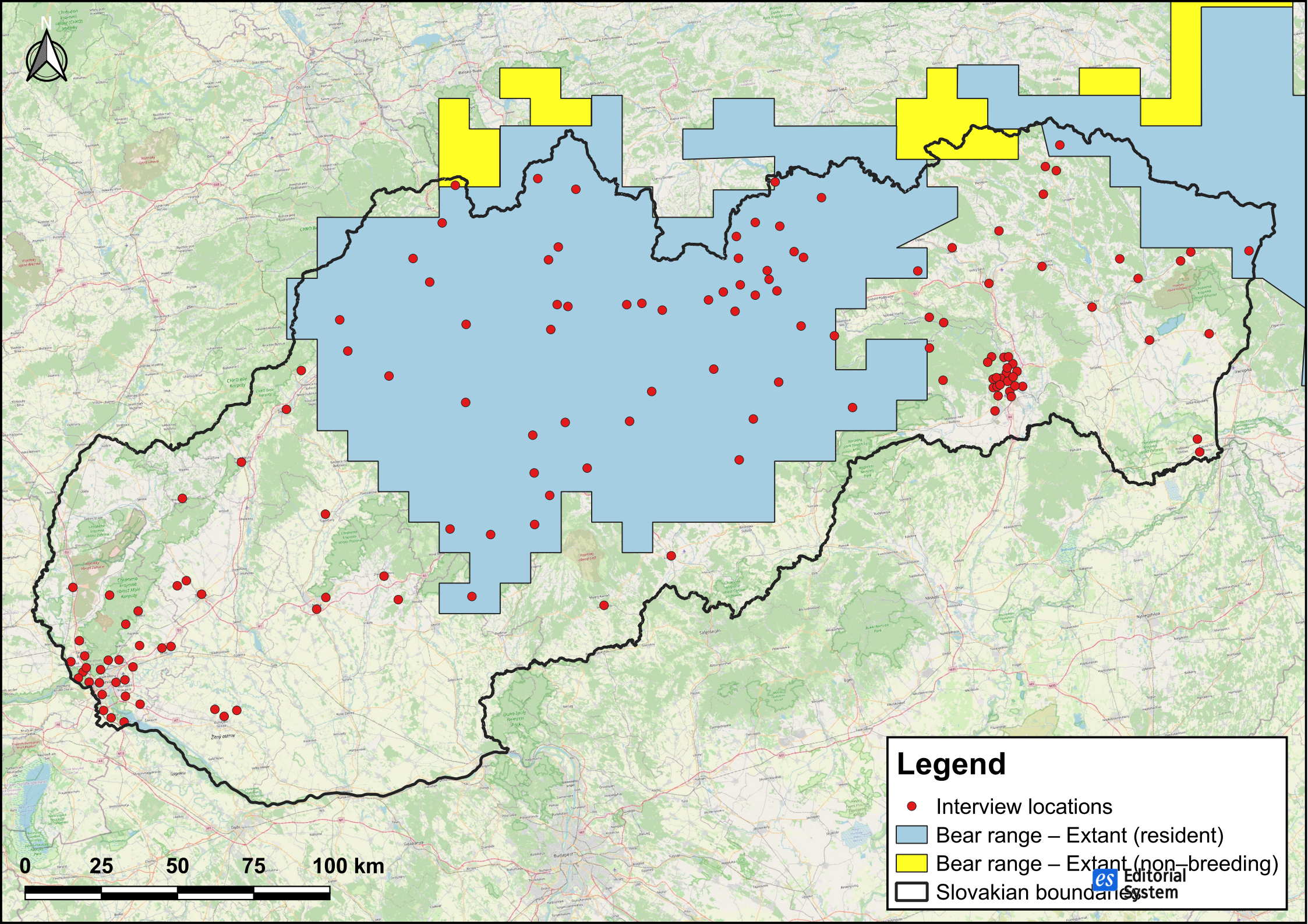
Table 9 – Results of the best cumulative link models (CLMs) about the best solutions aimed to solve the problems with bear in the High Tatras. Abbreviations: SE = standard error.

Response variable	Independent variable/s	Estimate	SE	z–value	*p*–value
(a) Do you think that killing food–conditioned bears is the best solution to reduce human–bear conflicts in the High Tatras?	Sex	-1.32	0.90	-1.46	0.14
	Age	0.05	0.01	3.53	< 0.001
	Level of education	-0.51	0.36	-1.42	0.15
	Bear occurrence	0.94	0.40	2.37	0.02
(b) Do you think that increasing the bear shooting quota is the best solution to reduce human–bear conflicts in the High Tatras?	Age	0.02	0.01	1.62	0.10
	Level of education	-0.48	0.24	-1.98	0.04
(c) Do you think that translocating confidential bears to less human populated areas is the best solution to reduce human–bear conflicts in the High Tatras?	Sex	-0.50	0.24	-2.03	0.04
	Bear occurrence	-0.61	0.26	-2.39	0.02
(d) Do you think that translocating problematic bears to captivity is the best solution to reduce human–bear conflicts in the High Tatras?	Age	0.03	0.01	3.40	< 0.001
	Level of education	-0.59	0.23	-2.52	0.01
(e) Do you think that creating artificial feeding points in the forest is the best solution to reduce bear damages in the High Tatras?	Sex	-0.50	0.28	-1.80	0.07
	Age	-0.03	0.01	-2.25	0.02
	Level of education	-0.38	0.28	-1.36	0.17
	Bear occurrence	-0.42	0.43	-0.97	0.33
(f) Do you think that installing electric fences around containers is the best solution to reduce bear incursions into human settlements in the High Tatras?	Age	0.01	0.01	1.35	0.18
(g) Do you think that replacing the actual containers with bear resistant ones is the best solution to reduce bear incursions into human settlements in the High Tatras?	Age	0.22	0.15	1.45	0.15
	Bear occurrence	-1.09	0.77	-1.42	0.16
(h) Do you think that moving containers closer to the city center/village is the best solution to reduce bear damages in the High Tatras?	Sex	-0.47	0.23	-2.05	0.04
	Bear occurrence	-0.65	0.25	-2.63	0.008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Legend
Interview locations
Bear range – Extant (resident)
Bear range – Extant (non–breeding)
Slovakian boundaries
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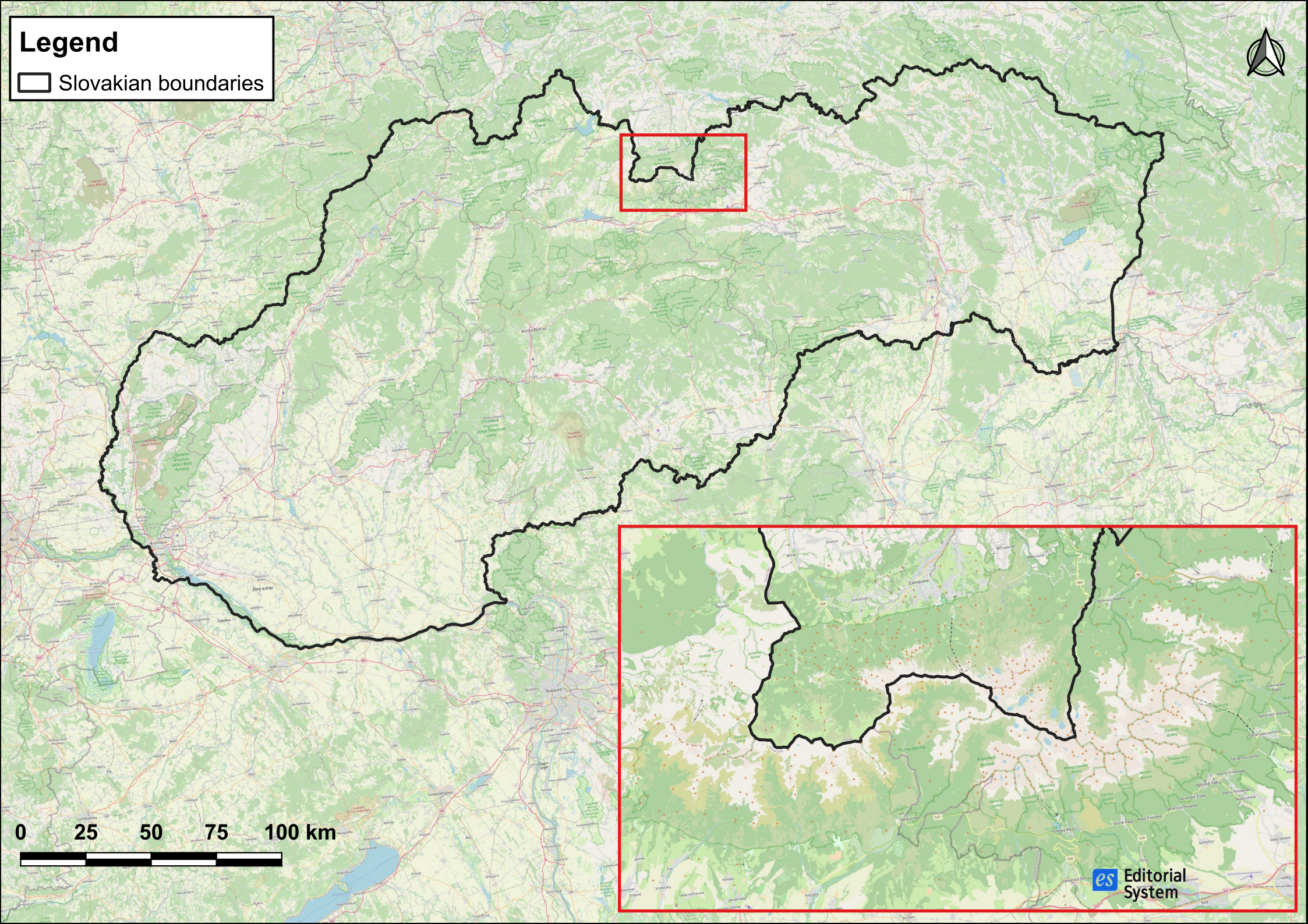
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Slovakian boundaries
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Editorial System

Figure 1 – Interview locations and bear range of distribution in Slovakia (IUCN, 2017).

Figure 2 – Location of the High Tatras in Slovakia (inset map).

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Tables

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