UNIVERZA V LJUBLJANI
BIOTEHNIŠKA FAKULTETA

Vesna MIHELIČ ORAŽEM

ZNANJE IN STALIŠČA ANKETIRANCEV O VELIKIH ZVEREH V FORMALNIH IN NEFORMALNIH UČNIH OKOLJIH

DOKTORSKA DISERTACIJA

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KNOWLEDGE ABOUT AND ATTITUDES TOWARD LARGE CARNIVORES IN FORMAL AND INFORMAL LEARNING ENVIRONMENTS

DOCTORAL DISSERTATION

Ljubljana, 2022

“The highest result of education is tolerance.” (Hellen Keller)

Na podlagi Statuta Univerze v Ljubljani ter po sklepu Senata Biotehniške fakultete in sklepa Komisije za doktorski študij Univerze v Ljubljani z dne 8. 11. 2016 je bilo potrjeno, da kandidatka izpolnjuje pogoje za opravljanje doktorata znanosti na Interdisciplinarnem doktorskem študiju Bioznanosti, znanstveno področje biologija. Raziskovalno delo je potekalo v Delovni skupini za biološko izobraževanje, na Oddelku za biologijo Biotehniške fakultete. Za mentorja je bil imenovan doc. dr. Iztok Tomažič.

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Datum zagovora: 11. 11. 2022

Vesna Mihelič Oražem

KLJUČNA DOKUMENTACIJSKA INFORMACIJA

ŠD Dd
DK UDK 37.011.3-052:369.111.7(043.3)
KG velike zveri, medved, volk, ris, stališča, prepričanja, znanje, delavnice, pouk, učenci, dijaki, obiskovalci, živalski vrt
AV ORAŽEM, Vesna, prof. biol. in gosp.
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ZA Univerza v Ljubljani, Biotehniška fakulteta, Interdisciplinarni študijski program Bioznanosti, znanstveno področje biologija
LI 2022
IN ZNANJE IN STALIŠČA ANKETIRANCEV O VELIKIH ZVEREH V FORMALNIH IN NEFORMALNIH UČNIH OKOLJIH
TD Doktorska disertacija
OP X, 142 str., 4 sl., 3 pril., 189 vir.
IJ sl
JI sl/en
AI Velike zveri ogrožajo različni dejavniki, eden pomembnejših je sprejetost vrst v javnosti. Poznavanje stališč in znanja ljudi je postalo osrednji cilj varstvene biologije, pri čemer se pomemben vpliv pripisuje izobraževanju. V raziskavi smo se osredotočili na ovrednotenje znanja in stališč o velikih zvereh med ciljno širšo javnostjo, učenci in dijaki, ter analizirali dejavnike, ki vplivajo na oblikovanje stališč in izgradnjo znanja. V obliki samoporočil smo pridobili informacije o stališčih, preko preizkusov znanja pa smo ovrednotili vpliv znanja na stališča 2218 sodelujočih. Rezultati kažejo, da znanje in raven izobrazbe v največji meri vplivata na varstvena prepričanja obiskovalcev živalskega vrta o velikih zvereh. Količina znanja je bila povezana s pozitivnimi in negativnimi prepričanji, stopnja izobrazbe pa je omilila ohranjanju nasprotujoča prepričanja. Kot pomemben dejavnik se je izkazal tudi spol. Dijaki so v splošnem izkazali pozitivna stališča, vendar pomanjkljivo znanje o volkovih. Smer izobraževanja je vplivala tako na stališča kot tudi na znanje, spol pa je bil povezan le s stališči dijakov. Na interes za učenje o volkovih so vplivali letnik izobraževanja, spol in prisotnost lovca v družini. Opazovanje volka v naravi pa je bilo povezano z manj izraženega strahu in posledično višjim sprejemanjem vrste. Pri raziskovanju vpliva različnih učnih metod v povezavi z volkovi smo zaznali doprinos vseh načinov izobraževanja, pri čemer je imela delavnica z aktivno udeležbo dijakov v spremenjenem učnem okolju največji učinek. Znanje je pomembno vplivalo tudi na oblikovanje stališč do medvedov. Spol in neposredna izkušnja sta pomembno vplivala tako na izražanje stališč kot tudi na količino znanja. Vpliv pouka je bil povezan s količino znanja, ne pa tudi s splošno spremembo stališč do medvedov.

KEY WORDS DOKUMENTATION

DN Dd
DC UDC 37.011.3-052:369.111.7(043.3)
CX large carnivores, bear, wolf, lynx, attitudes, beliefs, knowledge, workshops, instructions, students, visitors, zoo
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PB University of Ljubljana, Biotechnical Faculty, Interdisciplinary Doctoral Programme in Biosciences, Scientific Field Biology
PY 2022
TI KNOWLEDGE ABOUT AND ATTITUDES TOWARD LARGE CARNIVORES IN FORMAL AND INFORMAL LEARNING ENVIRONMENTS
DT Doctoral dissertation
NO X, 142 p., 4 fig., 3 ann., 189 ref.
LA sl
AL sl/en
AB Large carnivores are threatened by various factors, one of the crucial being public acceptance. Researching attitudes and knowledge has become a central goal of conservation biology, with a significant impact attributed to education. This research focused on the evaluation of knowledge and attitudes toward large carnivores among the targeted general public and students. Besides, factors that influence attitude formation and the amount of knowledge were analyzed. In the form of self-reports, we obtained information on attitudes, and through knowledge tests, we evaluated the impact of knowledge on the attitudes of 2218 participants. Knowledge and education level have the greatest impact on zoo visitors' conservation beliefs. The first was associated with positive and negative beliefs, and the latter mitigated the opposing beliefs. Gender also proved to be an important factor of influence. Students showed positive attitudes in general, but their knowledge of wolves was lacking. Type of education influenced both attitudes and knowledge, while gender affected only students' attitudes. Interest in learning was influenced by study year, gender, and the hunter in the family. Seeing wolf in nature correlated with less pronounced fear and consequently higher acceptance of the species. In the case of wolves, a positive contribution of all teaching methods was detected, with the student-centered out-of-school workshop having the greatest impact. Knowledge significantly shaped students' attitudes towards bears, while gender and direct experience affected knowledge and attitudes. The impact of instructions was related to the amount of knowledge, but not the general change in attitudes toward bears.

KAZALO VSEBINE

KAZALO ZNANSTVENIH DEL

KAZALO SLIK

KAZALO PRILOG

1 UVOD S PREDSTAVITVIJO PROBLEMATIKE, CILJEV IN ZNANSTVENIH VPRAŠANJ

1.1 OPREDELITEV RAZISKOVALNEGA PROBLEMA

1.1.1 Velike zveri na območju Slovenije in širše

Velike zveri, kot so rjavi medved (*Ursus arctos* L.), volk (*Canis lupus* L.) in evrazijski ris (*Lynx lynx* L.), že od nekdaj prihajajo v stik in posledično konfliktne situacije s človekom (Breitenmoser, 1998), zaradi česar so bile v obdobju med 18. in 20. stoletjem iztrebljene iz gosto naseljenih predelov Evrope ali pa je njihova številčnost drastično upadla (Breitenmoser, 1998; Chapron in sod., 2014; Linnell in sod., 2009). Od leta 1991 so velike zveri opredeljene kot zavarovane vrste. Poleg vključitve vrst v *Uredbo o zavarovanih prosto živečih živalskih vrstah* (Uredba …, 2004) in *Zakon o ohranjanju narave* (ZON-UPB2) (Zakon …, 1999) je bilo prenesenih več mednarodnih in implementiranih nacionalnih dokumentov, ki opredeljujejo obveznosti za varstvo omenjenih vrst. Vse tri vrste velikih zveri danes naseljujejo večji del Evrope in so stalno prisotne na območju Slovenije (Bartol in sod., 2020; Chapron in sod., 2014; Jerina in Ordiz, 2021; Krofel in sod., 2021). Najštevilčnejši predstavnik velikih zveri v Sloveniji je rjavi medved. Zadnja ocena številčnosti, izvedena na podlagi genetskih analiz, je bila izvedena v letu 2015 (Skrbinšek in sod., 2019b). Ker se sistematični monitoring za rjavega medveda ne izvaja, se, predvsem za namene upravljanja, številčnost populacije opredeljuje na podlagi matematičnega modeliranja. Za leto 2018 je matematični model opredelil najvišjo letno številčnost osebkov v populaciji na 975 (875–1130) medvedov (Jerina in Ordiz, 2021). Poleg rjavih medvedov je bilo na območju Slovenije v sezoni monitoringa 2019/2020 prisotnih 16 tropov volkov. Teritorij štirih tropov sega tudi na območje Hrvaške, zato so opredeljeni kot čezmejni. Številčnost volka v Sloveniji je bila v sezoni 2019/2020 ocenjena na 113 (104–129) osebkov (Bartol in sod., 2020). Populaciji obeh vrst, tako rjavega medveda kot volka, sta v Sloveniji opredeljeni kot vitalni in stabilni (Bartol in sod., 2020; Skrbinšek in sod., 2019a). Najmanj pogost in najbolj ogrožen predstavnik velikih zveri pa je evrazijski ris. Predvsem zaradi parjenja v sorodstvu je obstoj dinarske populacije na območju Slovenije močno ogrožen (Sindičić in sod., 2013). V ta namen poteka doseljevanje nesorodnih osebkov iz karpatske populacije. V sezoni monitoringa 2019/2020 je bilo na območju Slovenije zabeleženih 19 (17 rezidentnih in dva doseljena) evrazijskih risov, kar predstavlja minimalno številčnost populacije (Krofel in sod., 2021). Nato je bilo v letih 2020 in 2021 doseljenih še osem dodatnih osebkov (LIFE Lynx, 2021).

Velike zveri za svoj obstoj potrebujejo velik, zanje primeren življenjski prostor (Gittleman in sod., 2001; Santini in sod., 2013), ki se zaradi majhnosti zavarovanih območij v Evropi ne omejuje le na strnjene gozdne predele kot primarni habitat teh vrst (Linnell in sod., 2001; Santini in sod., 2016). Čeprav so lokalne gostote populacij velikih zveri navadno majhne (Gittleman in sod., 2001; Santini in sod., 2013), lahko pojavljanje velikih zveri tudi na območjih zunaj njihovih naravnih habitatov povzroči potencialne in celo realne konflikte s človekom (Chapron in López-Bao, 2014; Wolf …, 2019). Zaradi prepričanja, da prisotnost teh vrst negativno vpliva na človekov vsakdan, je negativno dojemanje velikih zveri globoko zakoreninjeno (Treves in Karanth, 2003). Omenjene vrste so ogrožene zaradi naravnih dejavnikov, predvsem zaradi delovanja človeka. Zaradi slednjega je bilo iskanje načinov in rešitev za njihovo ohranitev opredeljeno kot prednostna naloga (Redpath in sod., 2017, str. 1). Vedenje velikih zveri je v precejšnji meri plastično, kar jim omogoča preživetje na območjih, ki jih je spremenil človek. Vendar le, če so sprejete s strani tako ljudi kot tudi politike (Chapron in sod., 2014; Reinhardt in sod., 2019). Za dosego le-tega je Heberlein (2012) predlagal tri vidike, ki morajo biti upoštevani pri načrtovanju upravljavskih aktivnosti: kognitivni (npr. izobraževanje), tehnološki (uporaba različnih preventivnih in drugih ukrepov, kot so npr. ograje, odvračala, lov) in strukturni (zakonodaja in druge pravne podlage). Čeprav je strukturni vidik nujno potreben, sam po sebi ni dovolj učinkovit za ohranjanje in uspešno upravljanje z velikimi zvermi (Cimatti in sod., 2021), vseeno pa je ravno zakonsko varovanje vrst omogočilo njihovo ponovno naseljevanje Evrope (Linnell in sod., 2001). Strukturni vidik je tako tesno povezan s tehnološkim, saj je opredelitev velikih zveri kot zavarovanih vrst spodbudilo iskanje načinov, ki bi preprečevali konflikte in omogočali njihov soobstoj z ljudmi (Volski in sod., 2021). Poleg učinkovitosti ukrepov, ki preprečujejo konflikte, kot so škode na človekovem premoženju, pa je izjemnega pomena sprejemanje ukrepov med ljudmi (Volski in sod., 2021). Tu naletimo na povezavo obeh predhodnih še s tretjim, kognitivnim vidikom. Kljub pomembnosti in povezanosti vseh treh vidikov pa je le kognitivni tisti, ki lahko vpliva na spremembo stališč ljudi kot napovedovalcev potencialnih ali dejanskih vedenj. Eno izmed pomembnih orodij, ki vplivajo na izoblikovanje stališč, je zagotovo izobraževanje, ki ga je združenje za varstveno biologijo opredelilo kot enega najpomembnejših ciljev za ohranjanje vrst (Trombulak in sod., 2004).

1.1.2 Dejavniki vpliva na ohranjanje velikih zveri

Velike zveri ogrožajo različni dejavniki. Čeprav so nekatere populacije velikih zveri v Evropi opredeljene kot stabilne, pa kljub njihovi številčni rasti dolgoročna vitalnost ni zagotovljena, zaradi česar morajo biti naslovljene vse aktualne in predvidene grožnje (Boitani in sod., 2015). Vse tri vrste velikih zveri ogrožajo predvsem izguba,

fragmentacija in izolacija habitata, predvsem zaradi razvoja infrastrukture (Boitani in sod., 2015; Ripple in sod., 2014). Zadnje raziskave kažejo, da je na določenih predelih Evrope habitat za velike zveri povsem primeren, saj je pogojen s širjenjem gozdnih površin, zmanjšanjem gostote prebivalstva na podeželju in krčenjem obdelovalnih kmetijskih površin (Cimatti in sod., 2021). Velike zveri pa so odvisne tudi od razpoložljivosti plenskih vrst in drugih virov hrane na določenem območju (Wolf in Ripple, 2016). Poleg ekoloških dejavnikov velike zveri ogrožajo tudi t. i. intrinzični biološki dejavniki, kot je naključna umrljivost (Boitani in sod., 2015). Predvsem rjavega medveda in volka ogroža tudi smrtnost v prometu (Bartol in sod., 2020; Skrbinšek in sod., 2019a). Volku predstavlja dodatno grožnjo tudi hibridizacija s psi (Boitani in sod., 2015). Zaradi sorodnosti in izoliranosti populacije evrazijskega risa na območju Slovenije je posledično ta vrsta v naši državi ogrožena predvsem zaradi parjenja v sorodstvu (Sindičić in sod., 2013).

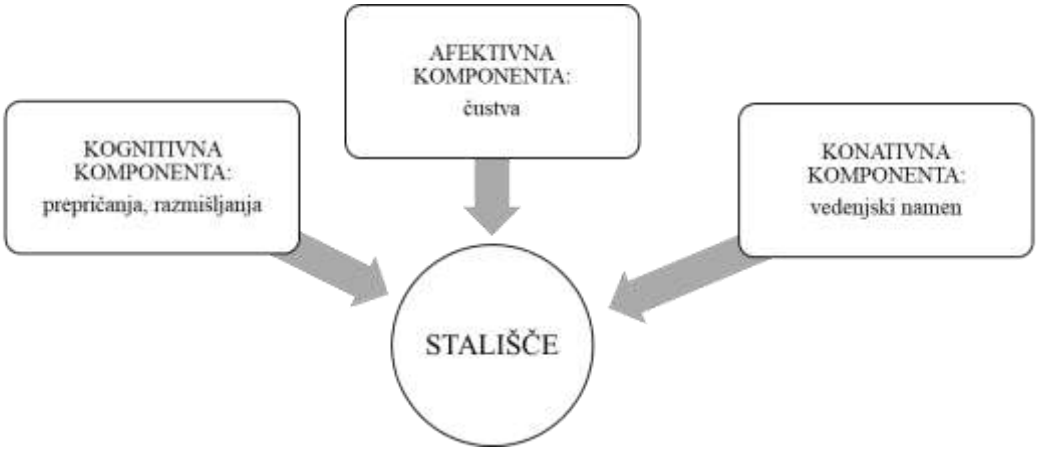
Nezanemarljiv vpliv na ohranjanje in upravljanje z velikimi zvermi imajo antropogeni dejavniki, saj velike zveri navadno ogroža ravno nizka sprejetost s strani posameznih interesnih skupin (Boitani in sod., 2015). Velike zveri lahko ob ponovnem naseljevanju Evrope zasedejo tudi manj primerne habitate, če le niso preganjane s strani ljudi (Reinhardt in sod., 2019). Nezakonit lov namreč še vedno predstavlja grožnjo posameznim populacijam velikih zveri (Boitani in sod., 2015). Ponovnemu naseljevanju lahko sledijo tudi novi konflikti, ki morajo biti ustrezno upravljani, da ponovno ne ogrozijo obstoja vrst (Bautista in sod., 2019). Najpogostejši konflikti se pojavljajo med človekom in dvema vrstama velikih zveri, volkom in rjavim medvedom. Vzroki za konflikte z medvedom so raznoliki (Jerina in sod., 2015). Večina jih je povezanih z medvedjim oportunističnim načinom prehranjevanja (Majić in Krofel, 2016). Zaradi škod na človekovem premoženju in zahajanja v naselja, ker imajo dostop do nezaščitenih virov hrane, se nižje sprejemanje vrste kaže predvsem med rejci pašnih živali in drugimi deležniki s področja kmetijstva, pa tudi med lokalnimi prebivalci (Majić Skrbinšek in sod., 2019). Konflikti z volkom so vezani predvsem na škode na pašnih živalih (Fernández-Gil in sod., 2018). Ravno zato je sprejemanje vrste najnižje med rejci pašnih živali, pa tudi lokalnimi prebivalci, kjer so škodni dogodki pogostejši (Mavec in Majić Skrbinšek, 2020), saj ljudje dojemajo vrsto kot grožnjo (Skogen, 2001; Treves in sod., 2013). Predvsem na območjih Evrope, ki jih volkovi ponovno naseljujejo, se lahko pojavlja pretiran strah pred to vrsto (primer Barkham, 2017). Konfliktne situacije med evrazijskim risom in človekom so v primerjavi z drugima vrstama velikih zveri praktično zanemarljive (Breitenmoser in sod., 2000). Eden izmed glavnih razlogov za ogroženost evrazijskega risa v Evropi je nizko sprejemanje s strani določenih interesnih skupin, predvsem lovcev, in sicer kot posledica konfliktov zaradi plenjenja srnjadi in drugih parkljarjev (Boitani in sod., 2015). Ravno nasprotno je v Sloveniji zabeležena podpora lovcev k ohranitvenim aktivnostim evrazijskega risa (Majić Skrbinšek in sod., 2020), ki je izrednega pomena tako za trenuten obstoj kot tudi za dolgoročno ohranitev vrste.

Sprejemanje velikih zveri s strani javnosti ima tako velik vpliv na njihovo varstvo in ohranjanje (Majić in sod., 2011). Načrtovanje varstvenih in upravljavskih aktivnosti na področju velikih zveri mora temeljiti na poznavanju stališč javnosti do omenjenih vrst. Zaradi različne narave konfliktnih situacij med posamezno vrsto velikih zveri in človekom ter različnih dejavnikov, ki vplivajo na sprejemanje, mora biti načrtovanje akcij vrstno specifično (Karlsson in Sjöström, 2008).

1.1.3 Stališča in njihova povezava z vedenjem

Stališče se nanaša na vrednotenje objekta, ki se izraža na določenem gradientu, in se kaže v naklonjenosti ali nenaklonjenosti do le-tega (Eagly in Chaiken, 1993; Fishbein in Ajzen, 1975; Gall in sod., 1996). Posplošeno lahko trdimo, da so stališča izražena kot »za« ali »proti« objektu (Bem, 1970). Vendar Walley in sod. (2009) izpostavljajo, da se poleg naklonjenih in nenaklonjenih pojavljajo tudi nevtralna stališča. Thurstone (1928) je kot prvi opredelil metodologijo za vrednotenje stališč, lestvico, ki bi zajemala vso paleto mnenj, od najmanj do najbolj naklonjenih, zajemala pa bi tudi neopredeljena mnenja. Ob tem je predlagal, da se rezultate pridobljenih odgovorov predstavi v obliki frekvenčne porazdelitve. Danes uporabljamo številne pristope k meritvi okoljskih stališč in zavesti (Gifford, 2007). Ena izmed uveljavljenih pristopov k meritvi stališč je tudi t. i. Likertova lestvica, psihometrična lestvica odzivov (Likert, 1932). Meritve stališč lahko večinoma izvajamo le posredno, v obliki samoporočil. Sklepamo torej le na podlagi pridobljenih opazovanih odzivov, kot je npr. ocena všečnosti ali nevšečnosti oz. strinjanja ali nestrinjanja z določenim objektom, kar nam kljub temu poda dober vpogled v razumevanje in predvidevanje vedenja človeka (Ajzen in Cote, 2008).

Stališče je kot skupno vrednotenje sestavljeno iz treh komponent, in sicer iz kognitivne (prepričanja in razmišljanja o objektu), afektivne (čustva v povezavi z objektom) in konativne (vedenjski namen v povezavi z objektom) (Bizer, 2004; Breckler, 1984; Eagly in Chaiken, 1993; Triandis, 1971). Kljub temu da vse tri komponente vplivajo na oblikovanje stališča, njihovo delovanje ni vedno harmonično. To pomeni, da je lahko določena komponenta pozitivna, druga negativna, njun seštevek pa se izraža v stališču (Bizer, 2004).



Slika 1: Trikomponentni model stališča kot skupnega vrednotenja (povzeto po Bizer, 2004)

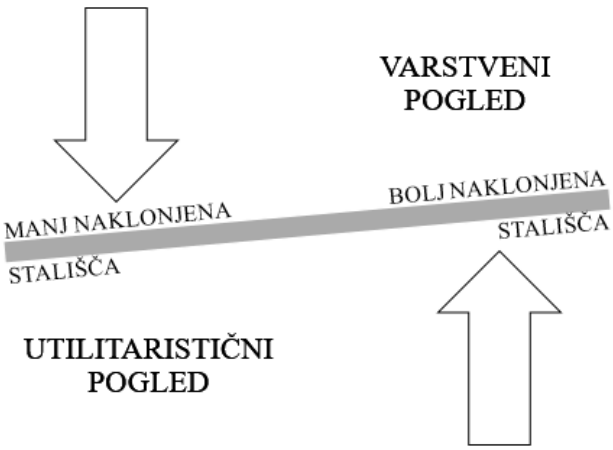
Ocena določenega objekta se torej lahko odraža v različnih prepričanjih, interpretacijah in čustvenih odzivih (Wood, 2000). Že sama prisotnost različnih čustev lahko privede k manj stabilnemu izoblikovanju stališč (k t. i. ambivalentnim stališčem). Velike zveri spadajo med t. i. karizmatične vrste, ki v ljudeh vzbujajo tako strah kot tudi občudovanje (Linnel in sod., 2000), kar povzroča sočasno naklonjenost in nenaklonjenost (Olson in Maio, 2003).

Stališča naj bi se po Jungu (1971) izražala znotraj širše definicije pripravljenosti psihe, da deluje ali reagira na določen način. Nekateri avtorji (Wilson in sod., 2000) menijo, da se pri posamezniku lahko pojavijo tudi t. i. »dvojna stališča«, pri katerih ne gre za razlike v čustvovanju, pač pa za proces spreminjanja stališč. Kljub temu da se stališče do objekta spremeni, pa novonastalo (eksplicitno) ne nadomesti prvotnega (implicitnega) stališča, ampak ga le zamenja. Stališče, ki ga posameznik izraža, je odvisno od zmožnosti kognitivnega priklica, saj je implicitno stališče shranjeno v nezavednem, eksplicitno pa v spominu in je zato lažje dostopno (Wilson in sod., 2002). Predhodno je tudi Jung (1971) trdil, da stališča pogosto obstajajo v parih, pri čemer je eno zavedno, drugo nezavedno. Omejitev raziskav, izvedenih na podlagi samoporočilnih lestvic, je pridobivanje eksplicitnih in ne implicitnih stališč posameznikov (Tomažič, 2009).

Poleg t. i. ambivalentnih in dvojnih stališč se pri posameznikih pojavljajo tudi nevtralna stališča. Edwards in Ostrom (1971) sta izpostavila, da je nevtralno stališče lahko posledica posameznikovih predhodnih izkušenj. Tako naj bi nevtralnost izvirala iz pomanjkanja izkušenj z objektom ali bila posledica pridobljenih le nevtralnih ali uravnoteženih pozitivnih in negativnih izkušenj. Poleg nevtralnosti do določenega objekta in informacij o njem pa se pri določenih posameznikih lahko izraža tudi t. i. namerna nevednost (ang. *strategic/wilful ignorance*) (Bell in sod., 2017). Posameznik lahko namerno zavrača nove ali prezira že pridobljene informacije o objektu. Kot primer sta preziranje informacij o onesnaževanju okolja ob nakupu letalskih kart (Thunström in

sod. 2014) ali hkratno izražanje skrbi glede odgovornega ravnanja ljudi in zavračanje informacij o specifičnih mesnopredelovalnih praksah (Onwezen in van der Weele, 2016).

Prepričanja posameznikov o naravi in njihovih občutjih, tudi do živali, je Kellert (1985, 1996) strnil v taksonomijo osnovnih vrednot oziroma stališč. Kasneje sta Gifford in Sussman (2012) predlagala, da se za stališča v povezavi z ohranjanjem narave in okolja uporablja dva pogleda/dimenziji, in sicer utilitaristični in varstveni. Utilitaristični pogled zajema predvsem zanimanje za koristi, ki nam jih nudi narava, in vrednost le-teh. Nasprotno se varstveni pogled opira na ohranjanje narave kot take in izraža zavedanje o njenem pomenu, ki ne temelji na koristih za posameznika. Izražanje namerne nevednosti bi lahko v povezavi z velikimi zvermi, poleg splošnega utilitarnega ali varstvenega pogleda, sprožala tudi prisotnost različnih čustev, predvsem jeze ali strahu. Tip in predvsem način posredovanja informacij osebam, ki le-teh pravzaprav nočejo, ostajata vrzel v znanju in predstavljata velik izziv tudi na področju ohranjanja in upravljanja z velikimi zvermi.



Slika 2: Utilitaristični in varstveni pogled ter njun vpliv na stališča, tudi do velikih zveri (prirejeno po Gifford in Sussman, 2012)

Oblikovanje stališč in njihovo spreminjanje sta obravnavana z različnih perspektiv. Perspektive obdelave informacij (ang. *information processing perspectives*) (Hovland in sod., 1953; McGuire, 1972) temeljijo na predpostavkah vedenjske teorije (Doob, 1947; Fishbein, 1963; Staats in Staats, 1958) in opredeljujejo stališča kot rezultat informacij, pridobljenih o objektu. Posledično se lahko spremenijo na podlagi prepričljive komunikacije in sprejetja novih informacij (Ajzen in Fishbein, 2000), saj način pridobitve informacije (posredno ali neposredno) pomembno vpliva na stališča (Olson in Maio, 2003). Pomemben pa je tudi tip informacije, saj negativna informacija vpliva na stališča v večji meri kot pozitivna (Ajzen, 2001). Iskanje in pridobivanje informacij v realnem času lahko privede do polarizacije evalvacije posameznika (Tesser in Contee, 1975;

Tesser in Leone, 1977; Tesser, 1978), posledično lahko pozitivna stališča do objekta postanejo še bolj naklonjena, negativna pa se še okrepijo in postanejo še bolj nenaklonjena (Ajzen in Fishbein, 2000). Omenjena perspektiva oblikovanja in spreminjanja stališč ne zajema vpliva čustev, zato je po mnenju nekaterih raziskovalcev (Ajzen in Fishbein, 2000) preveč posplošena.

Nasprotno, model pričakovanja in vrednosti stališč (ang. *expectancy – value model of attitude*) (Feather, 1959, 1982) vključuje tudi vlogo čustev in razmišljanj ter nadalje evalvacije. Stališče posameznika se tako oblikuje na podlagi subjektivnih vrednot in evalvacij atributov, povezanih z objektom. Ključen vpliv pa imajo povezave med omenjenimi dejavniki, saj prepričanje povezuje objekt z določenimi atributi. Močnejša je povezava med objektom in atributi, močnejše je prepričanje (Ajzen in Fishbein, 2000). Verplanken in sod. (1998, cit. po Ajzen, 2001) so izpostavili lažji priklic afekta pri vrednotenju določenega objekta kot pa kognicij. Poleg lažjega priklica pa afektivni del navadno prevlada nad kognitivnim (nad prepričanji posameznika) (Lavine in sod., 1998, cit. po Ajzen, 2001), kar je pomembno upoštevati tudi v primeru velikih zveri.

V teoriji načrtovanega vedenja (ang. *theory of planned behavior – TPB*), razširjeni verziji teorije razumne akcije (ang. *theory of reasoned action – TRA*) (Fishbein, 1967; Fishbein in Ajzen, 1975; Ajzen in Fishbein, 1980), je Ajzen (1991) opredelil tri postavke, ki sestavljajo t. i. »vedenjski namen«, ki nadalje vodi v dejansko vedenje. To so: »stališče do vedenja«, »subjektivna norma« in »zaznan vedenjski nadzor«.

Slika 3: Komponente t. i. vedenjskega namena, ki po Ajznu (1991) vodi v dejansko vedenje

Stališča do vedenja temeljijo na prepričanjih o možnih posledicah določenega vedenja in so lahko ugodna ali neugodna. Subjektivne norme ali družbeni pritiski pa temeljijo na prepričanjih glede normativnih pričakovanj drugih ljudi. Zaznan vedenjski nadzor predstavlja zaznano zmožnost ali težave pri uveljavljanju določenega vedenja in temelji na prepričanjih o dejavnikih, ki spodbujajo ali ovirajo to vedenje. Človekov namen za izvedbo določenega vedenja je bolj prisoten takrat, ko so stališča in subjektivne norme do vedenja ugodni, zaznan nadzor pa večji. Ko pa se pojavi priložnost, človek načrtovano vedenje navadno tudi izvede (Ajzen in Fishbein, 2000).

1.1.4 Vpliv različnih dejavnikov na oblikovanje stališč

Stališča posameznika se oblikujejo na podlagi delovanja različnih dejavnikov, kot so prepričanja (kognicije), afekti in čustva, vedenja in biološke predispozicije. Na stališča do okolja in narave vplivajo starost, spol, socialnoekonomski status posameznika, kraj bivanja (urbano ali ruralno okolje), politična opredelitev, narodnost, verska prepričanja, vrednote, izobrazba, izkušnje in pridobljeno znanje (Gifford in Sussman, 2012). Na izoblikovanje javnega mnenja vplivajo tudi stališča do t. i. ambasadorskih vrst, ki se nanašajo na popularne in karizmatične vrste, kamor uvrščamo tudi velike zveri (Kalterborn in sod., 2006). Kellert (1980, 1994) je izpostavil, da na proces izoblikovanja stališč do živali vpliva splošno vrednotenje prostoživečih živali, in ga opredelil kot enega izmed najpomembnejših dejavnikov vpliva.

V zadnjem času postajajo veliko bolj raziskani tudi biološki dejavniki. Predpostavlja se, da je človekova naklonjenost do določenih živalskih vrst v določeni meri evolucijsko pogojena, saj so tudi genetski dejavniki tisti, ki vodijo v oblikovanje stališč do živali (Clayton in sod., 2009; The Biophilia Hypothesis, 1993). Primer t. i. biološkega vpliva je razlika med spoloma. Znano je, da so dečki bolj naklonjeni domorodnim prostoživečim in eksotičnim živalskim vrstam, deklice pa tistim, ki nastopajo v vlogi ljubljenčkov (Lindemann-Matthies, 2005). Prav tako je za ženske značilno, da izražajo večjo skrb za okolje (Blocker in Eckberg, 1997; Gutteling in Wiegman, 1993; Tikka in sod., 2000; Zhang, 1994), čeprav je lahko njihovo okoljsko znanje manjše (Arcury in Christianson, 1993; Dahlgren in sod., 1977; Gambro in Switzky, 1999; Kellert, 1985a) in dejansko prookoljsko vedenje manj pogosto (Arcury in Christianson, 1993; Gambro in Switzky, 1999). Ta dognanja kažejo, da okoljsko znanje ni nujno povezano z izražanjem skrbi za okolje (Gifford in Sussman, 2012). Manj znanja o okolju in večja skrb naj bi bila pri ženskah povezana s splošno manjšim zanimanjem za naravoslovje in višjo stopnjo altruizma (Davidson in Freudenburg, 1996; Dietz in sod., 2002). Stališča do narave torej izhajajo tudi iz prepričanj in čustev posameznika (Pooley, 2000).

Razlike med spoloma pa se pojavljajo tudi pri izražanju strahu. Strah pred velikimi zvermi se pojavlja predvsem zaradi možnosti napada in posledičnih poškodb (Arrindell in sod., 2003). V večji meri se izraža pri ženskah, saj so z evolucijskega vidika zaradi nižjih fizičnih sposobnosti v manjši meri zmožne ubežati plenilcem, kar se izraža v t. i. protiplenilskem vedenju (Prokop in Fančovičová, 2010; Roskaft in sod., 2003; Shaw, 1977), ki ga pogojuje ravno strah, kar je v teoriji o biološki pripravljenosti leta 1971 opisal Seligman (cit. po Merkelbach in Muris, 2001). Strah kot negativno čustvo lahko vpliva tudi na manjši interes za učenje o zvereh, npr. volkovih (Glikman in sod., 2012). Nekateri avtorji (Arrindell in sod., 2003; Kaltenborn in sod., 2006; Kellert, 1987) so zato opredelili spol kot pomemben dejavnik vpliva na izoblikovanje stališč do živali, čeprav vpliv letega na sprejemanje živali ni povsem enoznačen (npr. Prokop in Tunnicliffe, 2010; Williams in sod., 2020).

Poleg bioloških dejavnikov pa gre pomemben vpliv pripisati tudi psihosocialnim in kulturnim (The Biophilia Hypothesis, 1993), kamor sodita dojemanje živali in poznavanje interakcij med človekom in živalmi (Kellert, 1994). Dojemanje velikih zveri je pogojeno s filogenetsko sorodnostjo živalske vrste in človeka, značilnosti živali, kot so estetska vrednost, inteligentnost, velikost in druge morfološke značilnosti, način gibanja, potencialna nevarnost za človeka ter njegovo lastnino in kulturnozgodovinsko ozadje (Burghardt in Herzog, 1980; Kellert, 1985). Lindemann-Matthiesova (2005) je na podlagi raziskave med več kot 4000 učenci izpostavila, da posamezniki različno dojemajo posamezne skupine živali zaradi bioloških predispozicij (genov) (npr. živalim, ki so za človeka v preteklosti predstavljale nevarnost, smo manj naklonjeni), kulturnih dejavnikov (npr. živalim pripisujemo različne lastnosti, kot so prijazni medved, zlobni volk), trenutne aktualnosti (npr. krovne vrste so večkrat medijsko izpostavljene v luči naravovarstva), nenazadnje pa tudi zaradi značilnosti dojemanja otrok, ki živali, ki so v njihovem okolju manj opazne, ne zaznajo.

V evropskem prostoru sta strah in negativno dojemanje predvsem volkov globoko zakoreninjena, saj je negativno predstavljanje vrste kot plenilca prisotno že v pravljicah (Kellert, 1985b; Prokop in sod., 2011; Røskaft in sod., 2003; Røskaft in sod., 2007). Izoblikovanje predstav tako ne temelji na neposredni izkušnji posameznika, ki promovira oblikovanje pozitivnih stališč (Tomažič, 2011), temveč v kulturnozgodovinskem ozadju.

Poleg kulturnozgodovinskega ozadja pa se razlike v prookoljskih stališčih odražajo tudi na podlagi osebnostnih značilnosti in vrednot posameznika, socialnoekonomskega statusa, pripadnosti določeni narodnosti, veroizpovedi in politični opredelitvi ter območja bivanja (Gifford in Sussman, 2012). Splošne ugotovitve so, da so prebivalci podeželja, kjer velik delež navadno predstavljajo deležniki s področja kmetijstva, bolj antropocentrični, prebivalci mest pa bolj ekocentrični. Prvi gledajo na pomembnost

varovanja narave z uporabnega zornega kota, saj nudi pomembne vire, drugi pa vidijo pomembnost varovanja narave kot take (Bjerke in Kaltenborn, 1999; Rauwald in Moore, 2002). Podobne ugotovitve se nanašajo tudi na stališča do velikih zveri, ki kažejo, da prebivalci na območju volka (ali so prepričani v prisotnost volka) izražajo bolj odklonilna stališča do vrste (Bjerke in sod., 1998; Chavez in sod., 2005; Ericsson in Heberlein, 2003; Roskaft in sod., 2007; Williams in sod., 2002). Karlsson and Sjöström (2007) sta velik pomen pripisala tudi bližini volčjega teritorija človekovim naseljem in opredelila vpliv tega dejavnika kot primerljivega s pripadnostjo določeni interesni skupini. Nasprotno pa nekatere študije (npr. Roskaft in sod., 2003) izpostavljajo, da so stališča podeželanov, ki živijo na območju volka, bolj naklonjena v primerjavi s prebivalci podeželja brez prisotnosti volka, kar kaže, da neposreden stik z vrsto lahko vzdržuje nizko toleranco. Prav tako imajo prebivalci območij, kamor se volkovi ponovno vračajo, bolj odklonilna stališča do vrste (Heberlein, 2012). Pri raziskavah stališč splošne javnosti v Sloveniji do medvedov in volkov (Majić in sod., 2019, 2020) tovrsten trend ni bil zaznan. Se pa kaže višje sprejemanje risa med prebivalci alpskega dela, kjer je vrsta manj pogosta (Mavec in sod., 2000). Rezultati nakazujejo, da prisotnost velikih zveri, preko izkušnje opazovanja, lahko pripomore k višji toleranci. V prihodnje pa je pričakovati, da bi se lahko podpora prebivalcev območij Slovenije, ki jih zveri ponovno naseljujejo, lahko zmanjšala zaradi novonastalih konfliktnih situacij.

Na prookoljska stališča pa vpliva tudi starost. Veliko študij podpira predpostavko, da mlajši izražajo večjo skrb za okolje kot starejši (Arcury in Christianson, 1993; Klineberg in sod., 1998; Zhang, 1994), kar velja tudi za starostne razlike med otroki in mladostniki (Szagun in Mesenholl, 1993). Podoben trend je bil opažen tudi pri raziskovanju stališč do volkov (Majić in sod., 2011). Razlike med starostnimi skupinami naj bi bile povezane z liberalnejšim razmišljanjem mlajših skupin (Gifford in Sussman, 2012). Majićeva in Bath (2009) sta izpostavila tudi zanimanje in vpetost starejših skupin v kmetijske teme, kar povezujeta z manjšo podporo vrsti. V metaraziskavi so upadanje podpore ohranjanju volkov v povezavi s starostjo izpostavili tudi Williams in sod. (2002). Pri otrocih pa je trend nekoliko drugačen. Največ strahu se pojavlja v zgodnjem obdobju, ki nato nekoliko upade, kasneje v odrasli dobi pa se zopet pojavi (Johnson, 1974).

Večja izražena skrb za okolje in naravo je povezana tudi z naravo povezanimi dejavnostmi na prostem (Hausbeck in sod., 1992; Palmer, 1993). Tudi v procesu izoblikovanja pozitivnih stališč do živali ima velik pomen neposredna izkušnja (Tomažič, 2011). Izkušnja z živalmi bi morala biti vključena v varstvene akcije, saj lahko zmanjša strah (Prokop in sod., 2009). V primeru velikih zveri bi lahko to neposredno izkušnjo predstavljalo opazovanje velikih zveri v živalskem vrtu. Negativna neposredna izkušnja pa lahko spremeni stališča do živali, če se le-te vedejo problematično (Kalterborn in sod., 2006; Williams in sod., 2002) ali vstopijo v urbana okolja (Bjerke in sod., 2002). Kot posredna izkušnja ima tudi posedovanje hišnih ljubljenčkov pozitiven vpliv na

izoblikovanje stališč do prostoživečih živali (Prokop in sod., 2009; Prokop in Tunnicliffe, 2010). Glikman in sod. (2012) so v svoji raziskavi preučevali vpliv stališč anketirancev do volkov in medvedov na njihova normativna prepričanja. Znanje so uporabili kot moderator tako kognitivne kot tudi afektivne komponente stališč. Izpostavili so, da večja količina znanja pozitivno vpliva na razvoj stališč. Ravno pri otrocih je kot zelo pomemben dejavnik, ki vpliva na izoblikovanje stališč, izpostavljeno znanje, kar kaže na pomemben potencial prookoljskega izobraževanja (Prokop in Tunnicliffe, 2008). Ne le znanje, s pozitivnimi stališči do narave in tudi velikih zveri sta povezani tudi stopnja (Bath in Buchanan, 1989; Kellert, 1985b) in smer izobrazbe (Prokop in sod., 2009; Schlegel in Rupf, 2010). Nekateri avtorji so že izpostavili izobraževanje kot pomemben dejavnik vpliva na izoblikovanje stališč (Bjerke in sod., 1998; Ericsson in Heberlein, 2003; Karlsson in Sjöström, 2007; Kellert, 1996; Williams in sod., 2002).

1.1.5 Pomen izobraževanja pri oblikovanju stališč in vedenja

Namen okoljskega izobraževanja in vzgoje je vplivati na izoblikovanje pozitivnih stališč do narave in živali (Prokop in Tunnicliffe, 2008). Ker predvsem formalni izobraževalni programi pogosto temeljijo na pridobivanju znanja in manj na zavedanju za ohranjanje narave (Keen, 1991; Torkar in sod., 2007; Yount in Horton, 1992), je lahko njihova učinkovitost zanemarljiva (Eagles in Demare, 1999). Malo pozornosti se namenja tudi izoblikovanju stališč, prav tako pomembnemu dejavniku v procesu oblikovanja vedenja posameznika (Fazio in Zanna, 1981; Šorgo in Ambrožič-Dolinšek, 2009). Pouk v bodisi formalnih bodisi neformalnih izobraževalnih ustanovah bi moral poleg pridobivanja znanja temeljiti na izoblikovanju stališč učencev. Če učenci poleg novega znanja oblikujejo tudi pozitivna stališča, jih le tako lahko usposobimo, da bodo odgovorni do okolja – spodbudimo prookoljsko vedenje (Bogner, 1999). Ključno je, da izobraževalne aktivnosti zajemajo neposredno izkušnjo z naravo, ki vpliva predvsem na dvig prookoljske zavesti (Duerden in Witt, 2010; Gillett in sod., 1991). Na podlagi pregleda različnih študij, ki so se ukvarjale z učinkovitostjo izobraževalnih aktivnosti, sta Gifford in Sussman (2012) opredelila naslednje komponente, na katere bi se morala priprava le-teh nanašati: upoštevati predznanje, stališča in stopnjo moralnega razvoja učencev, predstaviti problematiko z vseh zornih kotov, vzpodbujati realen stik z naravo in okoljem, vzpodbujati odgovornost posameznika in občutke nadzora nad problematiko, se predhodno seznaniti z akcijsko strategijo in uporabo veščin ter problematiko, razvijati prookoljske družbene norme ter vkomponirati čustveni vidik v programe same.

Kellert (1994) je zapisal, da se znanje lahko izraža kot ekološko in faktografsko ali pa kot okoljska ozaveščenost. Za izvedbo učinkovitih varstvenih in upravljavskih akcij je tako treba poleg stališč ljudi poznati tudi njihovo znanje o vrsti, njeni biologiji in ekologiji ter upoštevati vse druge dejavnike. Kellert (1996) je eden prvih avtorjev, ki je poleg drugih dejavnikov pripisal velik pomen izobraževanju kot enemu glavnih dejavnikov vpliva pri

izoblikovanju stališč do organizmov in narave nasploh. Evropski parlament je leta 2006 opredelil ključne kompetence za vseživljenjsko učenje, ki temeljijo na stališčih, znanju in spretnostih (Tomažič, 2010: 50). Z raziskovanjem stališč lahko ovrednotimo dojemanje različnih bioloških pojavov tako pri učencih kot tudi širši javnosti. Šele ko poznamo stališča, lahko razvijamo metodologijo za izboljšanje teh kompetenc (Tomažič, 2010).

Glavni cilj izobraževanja za ohranjanje je tako izobraziti javnost, kako sobivati z naravo. Ob osredotočenosti na znanje, stališča, izkušnje in spretnosti ljudi bi moral biti tovrstni način izobraževanja vpeljan v vse ravni izobraževanja (Trombulak in sod., 2004), saj je ravno tovrstno delo z ljudmi izpostavljeno kot pomembno orodje za doseganje uspešnosti varstvenih akcij (Patrick in sod., 2007). Znanje o živalih in stališča do njih so povezana s strahom. Znanje kot tako pa naj ne bi bilo zadostno za spremembo stališč do živali (Prokop in Tunnicliffe, 2008; Prokop in sod., 2009). Pomembno vprašanje, na katerega še ne poznamo odgovora, je, kaj lahko storimo, da pri učencih vplivamo na čustveno komponento stališč (npr. zmanjšamo strah pred zvermi) in spremenimo stališča v bolj pozitivna, kar dolgoročno pripomore k uspešnemu varstvu velikih zveri. Na to vprašanje smo skušali najti odgovore tudi preko našega raziskovanja.

Raziskave stališč učencev do družbenoznanstvenih tem v zadnjem času pridobivajo na pomenu. K temu je pripomogla ugotovitev, da samo znanje ne vodi nujno v želeno delovanje posameznika (Šorgo in Ambrožič-Dolinšek, 2009). Med te raziskave spada analiza stališč do posameznih vrst organizmov (npr. Kellert, 1985; Prokop in Tunnicliffe, 2010; Tomažič, 2008; Yore in Boyer, 1997). Raziskovanje stališč do nekaterih vrst temelji na konfliktih človek-žival (Špur in sod., 2016) v povezavi z različnimi dimenzijami odnosov med njima (Binngießer in sod., 2013) in samim ohranjanjem okolja (Binngießer in Randler, 2015). Analize stališč do velikih zveri temeljijo na stališčih do karizmatičnih vrst (npr. Barney in sod, 2005; Lukas in Ross, 2006) in vrst, ki vzbujajo strah v ljudeh (Prokop in sod., 2009a; Prokop in sod., 2009b; Thompson in Mintzes, 2002). Dosedanje raziskave so obravnavale predvsem stališča in znanje širše javnosti ali ciljnih skupin (npr. lovcev, kmetov in prebivalcev ruralnih območij) (npr. Bath in sod., 2008; Dressel in sod., 2014; Hogberg in sod., 2013; Kaczensky, 2000; Kaczensky in sod., 2004; Karlsson in Sjöström, 2007; Majić in sod., 2007; Majić in sod., 2011; Majić Skrbinšek in sod., 2019; Majić Skrbinšek in sod., 2020; Mavec in Majić Skrbinšek, 2020; Røskaft in sod., 2007; Zeiler in sod., 1999) oziroma starostnih skupin nad 18 let (npr. Bjerke in sod., 1998; Karlsson in Sjöström, 2007; Vittersø in sod., 1998) do velikih zveri. Le malo študij se je osredotočilo na osnovnošolce in mladostnike (Ambarli, 2016; Bath in sod., 2008; Prokop in Kubiatko, 2008; Prokop in Tunnicliffe, 2010; Randler in sod., 2020; Schlegel in Rupf, 2010; Skogen, 2001), niso pa obravnavale učinka izobraževanja na stališča do velikih zveri in na znanje o njih. Consorte-McCrea in sod. (2016) so izpostavili pomembnost raziskovanja stališč mladostnikov kot bodočih odločevalcev. Zaradi vrzeli v znanju smo se osredotočili na raziskovanje stališč do velikih zveri in

znanja o njih med učenci višjih razredov osnovne šole in dijaki. Osredotočiti smo se želeli predvsem na pomen in učinkovite pristope poučevanja kot orodja za izgradnjo znanja in oblikovanja stališč. Ker pa obstaja zelo malo informacij o stališčih in znanju dijakov poklicnih šol, ki bodo v prihodnje vpeti v delo na področju velikih zveri, smo želeli oceniti njihova stališča in znanje o volkovih.

1.2 RAZISKOVALNI CILJI IN VPRAŠANJA

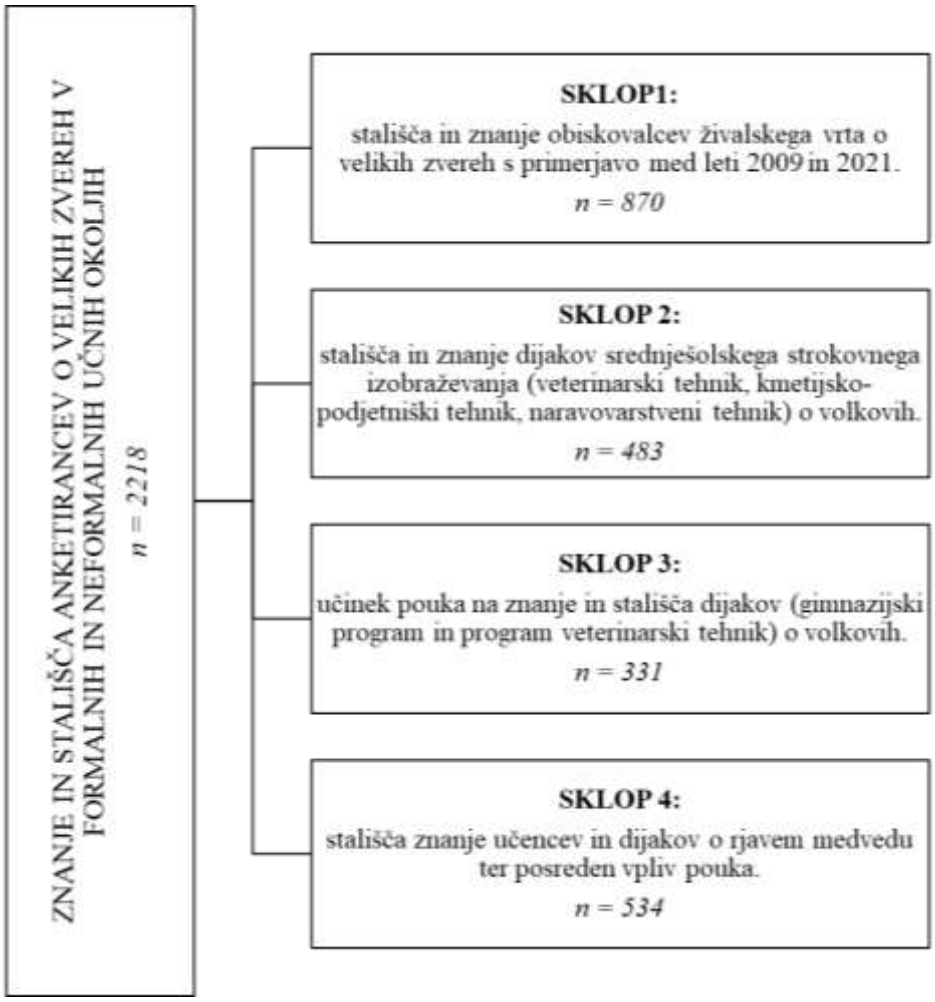
Namen in pričakovani rezultati doktorske disertacije so bili analizirati obstoječe stanje stališč ciljne širše javnosti (obiskovalcev Živalskega vrta Ljubljana) in osnovnošolcev ter dijakov srednjega strokovnega in splošnega izobraževanja do velikih zveri ali posamezne vrste ter opredeliti dejavnike, ki vplivajo na oblikovanje stališč. Samo analiza dejavnikov, ki vplivajo na stališča, ni dovolj. Pomembno je tudi raziskati, v kolikšni meri posamezen dejavnik vpliva, in proučiti pomen tistega, na katerega lahko s svojim delovanjem vplivamo. Pomemben dejavnik, s katerim lahko spreminjamo in oblikujemo stališča, je vsekakor izobraževanje. Ker so dosedanje raziskave temeljile le na preverjanju in analizi stanja, smo želeli v raziskavi proučiti tudi vpliv izobraževanja na oblikovanje stališč do velikih zveri. Z analizo vpliva izobraževanja na znanje in stališča do velikih zveri smo zapolnili vrzel pri poznavanju pristopov, s katerimi lahko oblikujemo in spreminjamo stališča.

V raziskavi smo uporabili različne vprašalnike, s katerimi smo preverjali stališča sodelujočih do velikih zveri, in preizkuse znanja, ki so služili za ugotavljanje vpliva znanja na stališča. Z izbranim načinom preverjanja lahko ugotavljamo vpliv izobraževanja na znanje in stališča ter sklepamo na prookoljsko delovanje posameznika. Analizirali smo podatke, ki smo jih sistematično zbirali med letoma 2009 in 2021. Raziskavo smo razdelili v štiri enote (sprva načrtovane tri), ki se med seboj povezujejo, na podlagi česar smo definirali tudi raziskovalna vprašanja in cilje.

Zastavili smo si naslednja raziskovalna vprašanja, ki smo jih glede na dispozicijo doktorske disertacije še razširili:

1) Kakšna so stališča obiskovalcev živalskega vrta do velikih zveri in koliko znanja imajo o njih? Dodatno smo izvedli primerjavo med letoma 2009 in 2021.
2) Kakšna so stališča dijakov različnih smeri strokovnega izobraževanja (veterinarski tehnik, kmetijsko-podjetniški tehnik in naravovarstveni tehnik) o volkovih in koliko znanja imajo o njih?
3) Ali imajo organizirane delavnice na temo volkov različen učinek na znanje in stališča dijakov (gimnazijski program in program veterinarski tehnik) o volkovih?

4) Dodatno raziskovalno vprašanje: Kakšna so stališča učencev o rjavem medvedu in koliko znanja imajo o njem ter kakšen je posreden vpliv organiziranih delavnic na njihova stališča in znanje?



Slika 4: Razdelitev raziskave (z navedenim skupnim številom sodelujočih) na štiri sklope (pri vsakem sta navedena število zajetih anketirancev in raziskovalni cilj)

Prvi raziskovalni cilj je bil analizirati stališča in znanje obiskovalcev Živalskega vrta Ljubljana o velikih zvereh Slovenije (rjavi medved, volk in evrazijski ris). Dosedanje raziskave na območju Slovenije obiskovalcev živalskega vrta, kot predstavnika neformalne izobraževalne ustanove, niso obravnavale. Prav tako je le malo raziskav, ki namenjajo pozornost znanju in stališčem obiskovalcev do velikih zveri. Pri analizi stališč in znanja anketirancev smo preverjali dejavnike, ki nanje vplivajo. To so predvsem spol, starostna skupina, stopnja izobrazbe, dosedanje pridobljeno znanje, območje prebivališča glede na prisotnost velikih zveri in število obiskov živalskega vrta, kamor preko opazovanja sodi tudi neposredna izkušnja z velikimi zvermi. Ker smo v analizi uporabili še neobjavljene podatke, pridobljene v letu 2009, smo želeli preveriti tudi sedanje stanje.

Zato smo anketiranje v letu 2021 ponovili in rezultate primerjali z letom 2009. Ta primerjava v dispoziciji doktorske disertacije ni bila predvidena, zato predstavlja nadgradnjo zastavljenih ciljev te enote. V tem delu doktorske disertacije smo uporabili prirejen vprašalnik, ki sta ga v svoji študiji uporabila Karlsson in Sjöström (2008). Dodatno smo za oceno znanja obiskovalcev o velikih zvereh uporabili vprašanja izbirnega tipa.

Drugi raziskovalni cilj je bil primerjati vpliv različnih smeri strokovnega srednješolskega izobraževanja (veterinarski tehnik, kmetijsko-podjetniški tehnik in naravovarstveni tehnik) na stališča in znanje anketirancev o volkovih. Omenjene smeri predstavljajo ustanove, v katerih poteka formalno izobraževanje. Prav tako so dijaki, vključeni v navedene programe, bodoči odločevalci, ki se bodo pri svojem nadaljnjem poklicnem delovanju zelo verjetno srečali s tematiko in problematiko, povezano z velikimi zvermi. Dejavniki, ki smo jih preverjali v tem sklopu, so: spol in letnik šolanja anketirancev, smer šolanja in prebivališče na območju pojavljanja volka. Zbrani podatki bi lahko bili indikativni za razvoj smernic za poučevanje učiteljev biologije in drugih predmetov na temo varstva in upravljanja z velikimi zvermi ter vključitve tovrstnih družbenoznanstvenih tem v kurikule srednjih poklicnih šol.

Tretji raziskovalni cilj je bil analizirati učinek delavnic (izobraževanja) na znanje in stališča dijakov gimnazije in srednje veterinarske šole do volkov. Namen tega sklopa je bil predvsem preveriti, ali se stališča in znanje srednješolcev spreminjajo zaradi poučevanja, ter opredeliti, kateri tip poučevanja je pri tem najučinkovitejši. V analizo podatkov je bilo vključenih več neodvisnih spremenljivk, kot so spol učencev, vrsta izobraževalnega programa, kraj bivanja dijakov (na območju stalne, občasne prisotnosti ali brez prisotnosti volka), prisotnost lovca v družini in reje pašnih živali v družinskem okolju ter srečanje z volkom v naravi.

Ker se na območju Slovenije pojavljajo konflikti predvsem z volkom in medvedom, smo k sprva predvidenim trem sklopom raziskave dodali še četrtega. Ta zajema stališča osnovnošolcev in dijakov splošnega izobraževanja do rjavega medveda in znanje o njem. Pri analizi smo upoštevali različne socialnodemografske dejavnike, kot so območje bivanja (urbano, suburbano ali ruralno okolje; območje stalne ali občasne prisotnosti medveda in območje brez prisotnosti medveda), spol, posedovanje hišnih ljubljenčkov (psa), prisotnost lovstva in reje pašnih živali v družinskem okolju, srečanje z medvedom v naravi, pogostost obiskovanja živalskega vrta (opazovanje medveda) in raven izobrazbe. Zaradi velikosti vzorca in posledično oteženega anketiranja na šolah smo vpliv organiziranih delavnic obravnavali posredno.

Skupni, razširjeni cilj doktorske disertacije pa je pridobiti informacije o dejanskem stanju znanja in stališč do velikih zveri tako med ciljno širšo javnostjo (obiskovalci Živalskega

vrta Ljubljana) kot učenci osnovnih in dijaki srednjih šol ter analizirati, kateri dejavniki vplivajo na oblikovanje stališč in znanja. Pri tem smo se osredotočili predvsem na vpliv izobraževanja kot orodja za spreminjanje in oblikovanje stališč ter znanja, kar predstavlja pomemben aplikativni vidik raziskave.

2 ZNANSTVENA DELA

2.1 ZNANJE IN STALIŠČA DIJAKOV SREDNJIH STROKOVNIH ŠOL DO VOLKOV

Znanstveno delo 1:

Oražem V., Tomažič I. 2018. The voccational upper secondary schools students' knowledge and their attitudes toward wolves. Journal of Baltic Science Education, 17: 918–934

Ohranjanje volka (*Canis lupus*) je večplastno, saj zajema usklajevanje mnenj med različnimi interesnimi skupinami. Namen raziskave je na podlagi anketnega vprašalnika oceniti stališča in znanje dijakov (n = 483 dijakov treh šol, starih 14–19 let), vpisanih v izobraževalne programe naravovarstveni, veterinarski in kmetijsko-podjetniški tehnik, saj njihov poklic predstavlja del omenjenega večplastnega konsenza. Rezultati raziskave kažejo, da imajo dijaki na splošno nevtralna do pozitivna stališča do volkov, njihovo znanje o vrsti pa je omejeno. Najbolj negativna stališča do volkov in najmanj znanja o le-teh so izkazali kmetijsko-podjetniški tehniki. Na splošno so bile ugotovljene korelacije med vsemi dimenzijami stališč, prav tako korelacije med dimenzijami stališč in znanja. Najvišje korelacije so se pokazale med dimenzijo ohranjanja in vsemi drugimi dimenzijami, vključno z znanjem. Ugotovitve raziskave podpirajo razširjeno domnevo, da naj bi se izobraževanje v okviru omenjenih izobraževalnih programov osredotočilo tudi na aktualna družbenoznanstvena vprašanja ohranjanja živali. Posebno pozornost je treba nameniti izobraževanju kmetijsko-podjetniških tehnikov, saj bi njihov utilitarni pogled lahko oviral učinkovito ohranjanje velikih zveri.

JOURNAL OF BALTIC SCIENCE EDUCATION

ISSN 1648-3898 /Print/
ISSN 2538-7138 /Online/

THE VOCATIONAL UPPER SECONDARY SCHOOLS STUDENTS' KNOWLEDGE AND THEIR ATTITUDES TOWARD WOLVES

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Abstract. *Wolf (Canis lupus) conservation is multidimensional. Its aspects include the consensus between different interest groups. The present research aimed to assess the attitude and knowledge of the students (N = 483 students from three schools age 14-19) enrolled in the environmentalist, veterinary and agricultural technician study programmes through a questionnaire, as their profession represents a part of this multidimensional consensus. The research results indicate that students have neutral to positive attitudes toward wolves, generally. Their knowledge of wolves, however, is limited. Agricultural technicians showed the most negative attitudes toward wolves and the lowest knowledge. Overall, correlations between all attitudinal dimensions and correlations between attitudinal dimensions and knowledge were found, with the highest correlations between conservation dimension and all other dimensions including knowledge. The research findings support the widespread assumption that education within the above-mentioned study programmes should focus also on the current socio-scientific issues of animal conservation. Special attention should be given to the education of agricultural technicians as their utilitarian view could interfere with the effective conservation of large carnivores.*

Keywords: *attitudes toward wolves, knowledge about wolves, vocational upper secondary school students.*

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Introduction

A wolf (*Canis lupus*) is a charismatic species which was heavily hunted and exterminated in the large part of Europe. Therefore, for most of the Europeans, attitudes towards wolves are not constructed on their primary experiences, but on sources such as Grimm's fairy tales (e.g. Little Red Riding Hood) where wolves are portrayed in a negative way (Kellert, 1985b). Negative attitudes towards wolves are an important factor of their abundance decrease (Majić Skrbinšek, 2012). Chapron et al. (2014) concluded that conservation of large carnivore species is only effective if positive public attitudes, besides implementation of actions which support human-carnivore coexistence and protective legislation, are considered. The big question is what can be done in schools to lower fears and change negative attitudes toward positive ones in order to help in wolf conservation efforts.

A wolf is the second most common species among large carnivores in Slovenia and Europe. Beside wolves, Slovenia is inhabited by brown bears (*Ursus arctos*), which are the most common and, Eurasian lynx (*Lynx lynx*) (Chapron et al., 2014) and, since 2005, the golden jackal (*Canis aureus*) (Krofel, 2009; Krofel & Potočnik, 2008).

The core area of wolf inhabitation is the south-western part of Slovenia. The population belongs to a wider Dinaric-Balkan population (Majić Skrbinšek, 2012) and consists of approximately 60 individuals (Bartol et al., 2017). Wolves prefer wide areas, where large prey abundance is high and disturbance is low (Jonozovič, 2003), but can also greatly adapt to live in human-dominated habitats (Chapron et al., 2014). Although, wolf populations and their habitats need to be preserved, one should be aware of the significance of human-wolf coexistence (Jonozovič, 2003). In Slovenia, from 1991 onwards, law protects wolves and other large carnivore species. Besides their inclusion in the Regulation on protected and wild animal species (Ur. l. RS, n. 46/04) and the Nature Conservation Act (ZON-UPB2) (Ur. l. RS, n. 96/04), several of documents defining obligations for aforementioned species protection were adopted.

Until now, many research studies assessing attitudes or perceptions towards different animal species were performed. They were focusing either on the animals that are disliked such as invertebrates (Kellert, 1993; Killermann, 1996), spiders, bats, snakes (Prokop, Özel, & Uşak, 2009; Prokop & Tunnicliffe, 2008, 2010; Tomažič, 2011a), endangered, i.e. amphibians

Journal of Baltic Science Education, Vol. 17, No. 6, 2018
ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

(Tomažič, 2011b; Prokop & Fančovičová, 2012), and charismatic or flagship species, such as primates (Lukas & Ross, 2005), sharks (Thompson & Mintzes, 2002) and dolphins (Barney, Mintzes, & Yen, 2005). Attitudes toward some animal species or animal groups are also researched in relation to human-animal conflicts (Špur, Pokorny, & Šorgo, 2016), or in relation to various dimensions of human–animal relationships (Binngießer, Wilhelm, & Randler, 2013) and environmental conservation (Binngießer & Randler, 2015).

Large carnivores, such as wolves, are also representatives of charismatic species. Because of their importance, these species have been the subject of many research studies. Besides various factors which influence attitudes development, such as age, gender, income, place of residence, and membership of interest group association (conservationists, hunters or livestock breeders), education is believed to be of great importance (e.g. Bjerke, Reitan, & Kellert, 1998; Ericsson & Heberlein, 2003, Karlsson & Sjöström, 2007; Kellert, 1996; Williams, Ericsson, & Heberlein, 2002). As early as in 1977, some authors (Dahlgren, Wywialowski, Bubolz, & Wright) reported that men generally possess more knowledge of wildlife than women. This trend is present already at a young age (Kellert, 1985a). Women are also believed to express more antipredatory feelings (e.g. Shaw, 1977), supposedly because their physical abilities to escape the predators are lower than in men (Røskaft, Bjerke, Kalternborn, Linnell, & Andersen, 2003). This was explicitly investigated by Prokop and Fančovičová (2010). The same applies for attitudes toward wolves. In a research conducted by Prokop and Tunnicliffe (2010), girls showed more negative attitudes towards wolves than boys. On the other hand, the meta-analysis carried out by Williams et al. (2002) established that s men's attitudes toward wolves are more negative than women's.

Johnson (1974) researched how children's age correlates with their attitudes toward wolves. Young children, less than ten years old, express the most negative attitudes. Surprisingly, when comparing these attitudes to those of adult people over thirty years old, the author found great similarity to the mentioned group of children (Johnson, 1974). Williams et al. (2002) in their meta-analysis of attitudes toward wolves reported that attitudes towards wolves become more negative with increasing age. The authors argued that correlation between age and negative attitudes may be due to cohort effect. Therefore, population aging does not necessarily correlate with more negative attitudes. A similar relation between age and attitudes was found in the survey conducted by Bjerke et al. (1998); the authors reported a decrease in pro-conservation attitudes towards wolves in a wolf region. In addition, Majić and Bath (2009) found, that older generations were far less influenced by wolf protection campaign than younger population and argued that the reason might be a higher "livestock concerns" of older generations.

The attitudes toward wolves are influenced not only by age, but also by the place of residence. Contrary to the established beliefs, attitudes differ between urban and rural areas. The research conducted in Sweden (Heberlein & Ericsson, 2005) shows attitudinal differences also among urban citizens. Multigenerational populations who live in urban areas can have more negative attitudes toward wolves, and also towards hunting than those who are tied to rural areas (e.g. their parents' rural origins) or have experiences with animals or hunting. Also, those who were born in cities of parents who lived in cities feel that wildlife is less important, in comparison to those with rural experience.

Heberlein and Ericsson (2005) argue that this phenomenon may be due to urbanisation and therefore conclude that "actions that increase urban residents' contacts with rural areas could, however, help promote or maintain more positive attitudes toward wildlife-related attitude objects such as hunting and wolves".

Attitudes towards wolves can also differ between residents in wolf areas and those living outside such areas. People who live in wolf areas tend to have less positive attitudes towards wolves (Bjerke et al., 1998; Chavez, Gese, & Krannich, 2005; Ericsson & Heberlein, 2003; Williams et al., 2002). Also, results of the research among Norwegians (Roskaft et al. 2007) showed more negative attitudes among people living in wolf area. The same effect was detected among people who only believe wolves are present in near surroundings of their homes. In contrast, authors (Roskaft et al., 2003) pointed out less self-reported fear among rural people living in wolf area than among people living in rural area, but with no wolf presence. Authors argued that the reasons for such result might be in more contact of people and wolves in wolf areas. The distance from wolf territories can therefore be an important factor of influence. Karlsson and Sjöström (2007) found that favourable attitudes towards wolf conservation are positively associated with the distance to the nearest wolf territory. The effect of the distance variable was shown to have a similar power as the variables of being a member of a nature conservation organization or being a hunter, owning livestock, or owning a hunting dog. Furthermore, the distance effect was present even on the micro-level, where people living in wolf territories had a more negative attitude towards conservation of wolves than people living just outside these territories.

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THE VOCATIONAL UPPER SECONDARY SCHOOLS STUDENTS' KNOWLEDGE AND THEIR ATTITUDES TOWARD WOLVES
(P. 918-934)
ISSN 1648-3898 (Print)
ISSN 2538-7138 (Online)

Attitudes towards animals are also linked with direct experiences with animals. Heberlein (2012) reported more negative attitudes of rural people, when wolves recolonized Sweden. More negative attitudes were the result of people's negative experiences with wolves, such as livestock, hunting dogs or pet predation. Williams et al. (2002) on the other hand concluded that people with fewer experiences with wolves have more positive attitudes towards them. Bjerke et al. (1998) argue that it is not just the experience that drives negative attitudes toward wolves, but also fear of being attacked.

Negative attitudes of livestock breeders toward wolves, and also other large carnivore species, have usually economic background even if breeders get damage payback. Besides livestock predation, wolves represent hunting competitors. Accordingly, these species are perceived as a threat (Skogen, 2001; Treves, Naughton-Treves, Shelley, 2013). Therefore, such interest groups usually support wolf hunting (Treves et al., 2013). But in general, members of hunting associations display more positive attitudes towards wolves than the general public (Williams et al., 2002).

Besides all reasoned factors that influence attitude formation, also having pets can lead to more positive attitudes and better knowledge of wolves (Prokop & Tunnicliffe, 2010). Some authors argued that fear and negative perceptions of wolves were often rooted in fairy tales of wolf predation (e.g. Røskaft et al., 2003; Røskaft, Händel, Bjerke, & Kaltenborn, 2007, see also Prokop, Usak, & Erdogan, 2011).

In the theory of planned behaviour (Ajzen, 1991), "behavioural intention", which generally leads to actual behaviour, is composed of three parts: "attitude toward the behaviour", "subjective norm", and "perceived behavioural control". Attitude is an evaluation of a certain object and can be either positive or negative. It consists of two parts; cognitive and affective. In their research, Glikman, Vaske, Bath, Ciucci and Boitani (2012) developed a model to research how respondents' attitudes towards wolves and bears influenced their normative beliefs (what agencies should do about their conservation). They used knowledge as moderator of both, cognitive and affective component. Greater amount of knowledge is believed to have positive influence on attitude development. For example, the results of Bath and Buchanan (1989) showed that education level (therefore knowledge in general) correlates with more positive attitudes toward wolves. However, they also pointed out, that respondents from Stock Grower Association hold negative attitudes regardless of their higher education. Ericsson and Heberlein (2003) reported that more acquired knowledge could lead to attitudes that are more positive.

Kellert (1985a) urged that children, who learn about animals in schools and zoos, gain insufficient knowledge and express negative attitudes. On the other hand, children engaged in programmes that are experience based, gain a more knowledge and expressed more positive attitudes toward animals than the former. In addition, the results of public perception of predators (Kellert, 1985b) also showed strong correlation of higher education (more knowledge) and positive attitudes toward wolves. According to Berninger, Kneeshaw and Messier (2009), newly acquired knowledge can affect attitude change among less knowledgeable people. On the contrary, high amount of knowledge can lead to more resistant attitudes and affect their reinforcement. Also, positive feelings (affective component) positively correlate with greater amount of knowledge. Glikman et al., (2012) therefore argued that people who express more positive feelings towards wolves might also be more willing to learn about them. People with more knowledge about these species will hold more positive feelings about wolves.

Problem of Research

The literature review revealed that surveys that assessed participants' knowledge of and attitudes toward wolves usually cover sample groups 18 years of age and over (i.e. Bjerke et al., 1998; Karlsson & Sjöström, 2007; Vittersø, Kalternborn, & Bjerke, 1998). Only a few research studies have been conducted among primary or secondary school students (Prokop & Kubiatko, 2008; Prokop & Tunnicliffe, 2010) and young people (age 16-20) (Skogen, 2001). Consorte-McCrea, Nigbur and Bath (2016) argued that attitudes of teenagers, as future wildlife decision makers, should be of worldwide concern. Since there is lack of information about vocational schools students' attitude and knowledge regarding large carnivores in general and the vocational high school students from the present sample will become wildlife decision makers, the authors set out to assess their attitudes and knowledge regarding wolves.

Research Focus

The present research included vocational upper secondary school students of veterinary, environmentalist and agricultural technicians. It is expected that during their working career this population will be directly involved

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ISSN 2538–7138 (Online)

in animal conservation, including conservation of large carnivores or be a part of an interest group that could influence wolf conservation (livestock breeders, farmers, hunters etc.) Consequently, they will make decisions with an impact on the management of these animals. The present research aimed to identify the factors which are significantly related to the participants' attitudes and knowledge of wolves (their place of residence (living in or outside wolf area; rural or urban residence), gender, study programme, year of study (grade), a hunter in their family and being livestock breeders' family member).

The data collected might be indicative for the development of guidelines in preparation of large carnivore conservation biology teacher manuals and the inclusion of such socio-scientific topics in the vocational secondary schools' curricula.

Methodology of Research

General Background

The research design was quantitative. For the purpose of the research, a non-random sample selection method was applied. Attitudes and knowledge about wolves of Slovenian vocational high school students were assessed by administering a questionnaire, consisting of attitudinal items (Kellert, 1996) and knowledge questions about wolves biology, ecology and conservation. The research was conducted in the selected vocational high schools in the study year 2015/2016.

Sample

Three Slovenian vocational upper secondary schools were selected for present research: the Biotechnical Educational Centre Ljubljana (the programme of Veterinary technicians, the School of Agriculture and Biotechnical upper secondary school Grm in Novo mesto, and Biotechnical Centre in Naklo (the programme of Environmentalist technician and the programme of Agricultural technician. The duration of all the programmes is four years. The reason for such sample collection is that the first and the last school are located outside the wolf area and the second school is bordering the wolf area. The school that educates Veterinary technician students is one of the two veterinary schools in Slovenia and the only school that enrolls students from and outside wolf area.

All of the students ($N = 493$) from the first three study years (14-19 years of age; first year students $M_{age} = 15.1$, $SD = 0.45$; second year students $M_{age} = 16.2$, $SD = 0.59$; third year students $M_{age} = 17.0$, $SD = 0.62$) were included in the research. The participants of the research represent the entire generation of the aforementioned programmes; 186 (37.7 %) were enrolled in the Veterinary technician's study programme, 138 (28.0 %) in the Environmentalist technician study programme, and 169 (34.3 %) in the Agricultural technician study programme.

The cohort from the Veterinary technician study programme consisted of predominantly females (74.1 %) while a large majority of the participants from the Agricultural technician programme were males (70.2 %). Among the participants from the Environmentalist technician programme both genders were equally represented (51.5 % female students). Six students did not report their gender. A little less than one fifth of the students (19.3 %; $N = 95$) reported their place of residence to be in a wolf area and 65.7 % ($N = 324$) in a rural area. Only 16.6% ($N = 82$) of students reported having a hunter in their family and only 49 (9.9 %) of students are from families of livestock breeders. Due to a small percentage and not equal distribution among different study programmes, the latter independent variable was excluded from the analysis.

All the necessary approvals were gathered before research began. First, consents were obtained from the school headmasters and teachers. Next, at the time of the questionnaire delivery, the students were informed that the questionnaires are anonymous and that the results would not affect their grades.

Instrument and Procedures

The questionnaire administered to the respondents consisted of three parts. It was developed at the Biotechnical Faculty in Ljubljana (Nagode, 2014) and was also used in the project SloWolf (2016).

The first part consisted of questions inquiring about the respondent's socio-demographics. The second part of the questionnaire was composed of 20 attitudinal items concerning wolves. A 5-point Likert type scale (from 1 – strongly disagree to 5 – strongly agree) was used to measure the respondents' attitudes toward (a) conservation

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of wolves, (b) fear of wolves, (c) their interest to learn about wolves and (d) their opposition to hunting or keeping wolves in captivity. Similar items, originating from the Kellert's (1996) typology of basic attitudes, were already used in the assessment of the respondents' attitude toward other animal groups or animal species (Kellert, 1996; Prokop et al. 2009; Prokop, Prokop, & Tunnicliffe, 2008; Prokop, Tolarovičová, Camerik, & Peterková, 2010; Prokop & Tunnicliffe, 2010). Two independent researchers checked the content validity of included items.

For the purpose of dependent variable number reduction, the principal component analysis (PCA) with Oblimin rotation was applied, through which four meaningful principal components (hereafter PC) were extracted (Table 1). Eigenvalue > 1.0 was used for the final solution. The Kaiser-Meyer-Olkin (KMO) measure of the sampling adequacy test (.899) and Bartlett's test for sphericity ($\chi^2 = 3534.80$; $df = 190$; $p < .001$) suggested that the analysis was appropriate for this data set. Namely, the value of KMO exceeded the critical value of 0.7 (Leech, Barrett, & Morgan, 2005). The first principal component explained 32.15% of total variance and all three components together explained 55.61 % of total variability. The minimum loading of at least .38 was used (Tabachnick & Fidell, 2007). PC I was termed "*Conservation*", PC II "*Fear of harm*", PC III "*Interest to learn*" and PC IV "*Hunt*". Cronbach α for total scale was .88. Also, Cronbach α's were satisfactory for first three PC's (PC I = .80, PC II = .78; PC III = .85). Cronbach α for PC IV was low (.59) and its eigenvalue was according to parallel analysis lower than corresponding random eigenvalue (https://analytics.gonzaga.edu/parallelengine/), therefore this PC should be interpreted with caution. Lower scores on "*Fear of harm*" – negativistic dimension mean more negative attitude.

Because the data on PC I and PC IV were not normally distributed, a two-step approach was applied for transforming non-normally distributed dependent variables to normal in SPSS (version 20.0) according to Templeton (2011). This approach was used on all PC's in order to unify the scales. After transformations, all PC's could be used in multiple regression procedures.

The third part of the questionnaire assessed the students'knowledge of wolves using 12 true/false statements and 9 multiple choice questions related to biology and wolf conservation. For each question, a "*Don't know*" option was included in order to minimize guessing. The summed score of correct answers was used in statistical analysis (Table 3).

Data Analysis

Raw data, obtained from the questionnaires were input into the computer programme Microsoft Office Excel, later transferred to the programme SPSS. First, basic descriptive statistics was calculated for individual knowledge and attitude items. The principal component analysis (PCA) was then applied in order to reduce the number of attitudinal dependent variables and to extract meaningful principal components (PCs).

Extracted PC's from attitude part of the questionnaire and summed knowledge scores were used as dependent variables which were analysed according to selected independent variables; place of residence (lives in wolf area or not; rural/urban residence), gender, study programme, year of study (grade), hunter in his/her family and if they are livestock breeders. Those variables served as independent predictors in multiple regression models. In multiple regression statistics, transformed attitudinal PC's was used, because the data on two PC's were not normally distributed (see Research instrument section above).

All statistical procedures were conducted using SPSS 20.0 software.

Results of Research

Students' Ratings of Individual Attitude Items

Table 2 shows the frequencies of attitudinal item ratings. Items represent four different attitudinal dimensions (Table 1); Ratings in "*Conservation*" domain show the participants' strong agreements with most statements. Item ratings on "*Negativistic*" domain present neutral opinions of the respondents. Only the ratings on two items show slightly higher agreement. The respondents' attitudes were neutral on all "*Scientistic*" items, which indicates a lack of interest to learn about wolves. Results on "*Hunting*" domain show negative opinions on two items, referring to hunting directly and to wolf abundance. The respondents strongly agreed only with the statement which refers to killing of wolves.

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Table 1. Principal component analysis with an Oblimin rotation of items to the individual attitudinal dimension.

Item	Principal component			
	I	II	III	IV
Conservation				
There is no need to preserve wolves in Slovenia, because they live elsewhere in Europe.*	.808			
All wolves should be exterminated.*	.741			
In Slovenia, wolves should be preserved for future generations.	.478			
Wolves are evil by nature because they attack livestock (sheep).*	.463			
If all wolves were killed in Slovenia, it would bother me.	.447			
Wolves should have rights too.	.402			
Harm - Negativistic				
I would be afraid walking through the forest, if I knew that wolves lived there.*		.855		
I would camp only where there are no wolves.*		.754		
I am afraid of wolves.*		.675		
Wolves should not be near human settlements.*		.592		
I would accept the wolf presence in forests near my neighbourhood.		.522		
Wolves are not dangerous to humans.		.408		
Interest to learn - Scientistic				
I would like to know how wolves developed.			-.892	
I like to watch popular science broadcasts about wolves.			-.829	
I would like to learn about different habitats of wolves.			-.811	
I like to read about wolves.			-.809	
Hunting				
It is cruel to keep wolves in captivity.				.813
I would ban any kind of wild game hunting.				.593
Killing wolves for fun is cruel.				.412
In Slovenia, wolves' abundance should increase.				.404
Cronbach's α (for all 20 items .88)	.80	.78	.85	.59
Eigenvalues	6.43	2.10	1.56	1.03
Explained variance	32.15	10.48	7.81	5.17
Mean	4.22	3.18	3.29	3.63
Standard deviation	0.72	0.77	0.94	0.83

*Note: * - reversed items; Principal component loadings over .38 are presented.*

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Table 2. Students' ratings of individual attitude items.

N	Item	M	SE	SD	f(%)				
					1	2	3	4	5
1	All wolves should be exterminated.*	4.6	0.04	0.94	4	1	6	11	79
2	There is no need to preserve wolves in Slovenia, because they live elsewhere in Europe.*	4.5	0.04	0.93	3	1	9	16	71
3	If all wolves were killed in Slovenia, it would bother me.	4.3	0.05	1.08	5	3	10	19	63
4	In Slovenia, wolves should be preserved for future generations.	4.2	0.04	0.93	2	3	16	30	50
5	Wolves should have rights too.	4.1	0.05	1.03	3	2	22	25	47
6	Wolves are evil by nature because they attack livestock (sheep).*	3.6	0.05	1.20	7	12	28	25	29
7	I would accept the wolf presence in forests near my neighbourhood.	3.6	0.05	1.13	4	13	28	29	26
8	I am afraid of wolves.*	3.5	0.05	1.19	6	14	26	28	25
9	I would be afraid to walk through the forest, if I knew that wolves lived there. *	3.2	0.05	1.19	7	22	29	24	18
10	I would camp only in places where there are no wolves.*	3.0	0.05	1.10	11	21	43	16	10
11	Wolves should not be near human settlements.*	2.9	0.05	1.07	11	23	43	15	9
12	Wolves are not dangerous to humans.	2.9	0.05	1.03	8	25	39	21	7
13	I would like to learn about different habitats of wolves.	3.6	0.05	1.10	6	9	34	30	23
14	I would like to know how wolves developed.	3.5	0.05	1.13	7	10	33	29	23
15	I like to watch popular science broadcasts about wolves.	3.2	0.05	1.16	10	13	37	24	16
16	I like to read about wolves.	2.9	0.05	1.14	16	17	43	15	9
17	Killing wolves for fun is cruel.	4.4	0.06	1.23	8	4	5	9	75
18	It is cruel to keep wolves in captivity.	3.6	0.06	1.21	6	13	25	24	32
19	In Slovenia, wolves' abundance should increase.	3.4	0.05	1.14	7	9	40	22	22
20	I would ban any kind of wild game hunting.	3.1	0.06	1.37	16	20	27	15	22

*Note: * reversed items.*

Students' Responses to Individual Knowledge Items

The highest percentage of correct answers was recorded for statements about hunting/management, wolves' role in ecosystem, state of threat, predation and systematics. The smallest percentage of correct answers was achieved in the section about wolves' ecology (with the exception of lifestyle) and anatomy (with the exception of recognition of carnivore skull). The average students' knowledge score was only 42.9% (9 out of 21 answers) (see Table 3 for more details).

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Table 3. Students' ratings of individual knowledge items.

N	Item	Wrong/correct statement	Correct	Wrong
1	Wolves do not need to be hunted in order to protect people.	C	74.8	25.2
2	Wolves are solitary animals.	W	70.4	29.6
3	People can replace the ecological role of wolves in nature.	W	66.5	33.5
4	A wolf is an endangered species in Slovenia.	C	65.3	34.7
5	Hunting wolves is not an effective method for prevention of livestock predation.	C	60.2	39.8
6	Because of their high abundance in Slovenia, wolves attack farm animals.	W	59.8	40.2
7	Wolves are dangerous to people.	W	49.9	50.1
8	The wolf is not native to Slovenia.	W	38.9	61.1
9	The wolf predates the healthiest herbivores in nature.	W	35.5	64.5
10	Many wolf cubs die in their first year.	C	25.8	74.2
11	In wolves, the mode of urination does not depend on gender (as in dogs) but on social rank/status.	C	23.9	76.1
12	Wolves walk or run approximately 7 km per day.	W	8.7	91.3
13	Encircle skull which is typical for carnivores.	Picture	93.3	6.7
14	Wolves are classified into a family of: dogs.	Multiple choice	89.7	10.3
15	Wolves live most of their lives: in packs.	Multiple choice	78.5	21.5
16	Wolves hunt especially: weakened herbivores.	Multiple choice	40.6	59.4
17	In Slovenia, wolf's main prey represent: deer and roe deer.	Multiple choice	40.0	60.0
18	In your opinion, how many wolves live in Slovenia?: 41-60.	Multiple choice	32.7	67.3
19	In Slovenia, the average body weight of a (male) wolf is between: 30-40 kg.	Multiple choice	16.2	83.8
20	How many cubs do wolves have?: 5-8.	Multiple choice	15.0	85.0
21	Wolves mate: in winter.	Multiple choice	5.5	94.5

The Results of Multiple Regression Analyses

The results of multiple regression analyses are presented in Table 4.

Female students supported conservation of wolves to a greater extent than male students. Also, the students enrolled in the Environmentalist and Veterinary technician study programmes had more positive attitudes toward wolves' conservation than the students enrolled in the Agricultural technician study programme.

On "*Fear of harm*" domain, the students of Veterinary technician programme showed significantly more positive attitudes toward wolves than Agricultural technician students. The same applied for Environmentalist technician students. In addition, the second-year students displayed less fear on harm of wolves than the first-year students, but there was no difference in ratings between the first and the third-year students. The respondent who reported having a hunter in their family, displayed less fear of harm than their counterparts.

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On "*Interest to learn*" domain, students who were enrolled in Veterinary technician and Environmentalist study programme, showed significantly more positive attitudes toward wolves than the students of Agricultural technician study programme. The third-year and male students were less willing to learn about wolves than the first and the second-year students or female students.

On "*Hunting*", the students enrolled in Veterinary technician and Environmentalist technician study programmes showed significantly more positive attitudes toward wolves than the students of Agricultural technician study programme. Male students less strongly opposed hunting wolves or keeping them in captivity than female students. Also, the students living in rural areas less strongly opposed hunting wolves or keeping them in captivity than their counterparts.

The study programme was the only predictor that showed contribution to the mentioned dependent variable. The most knowledgeable were the students from Veterinary technician programme, followed by Environmentalist study programme students.

Table 4. Multiple regression (forward stepwise method) on Conservation (PC I) domain.

	B	*SE* of *B*	β	*t*	*p*	Predictors
Conservation (PC I) domain: $R^2 = 0.256$, $F(3,479) = 54.95$, $p < .001$						
(Constant)	3.98	0.061		64.76	< .001	
Gender (male)	-0.274	0.058	-0.200	-4.700	< .001	Wolf area, place of residence, hunter in the family and grade were excluded from the model.
Environmental	0.510	0.070	0.333	7.270	< .001	
Veterinary	0.611	0.069	0.434	8.922	< .001	
Fear of harm (PC II) domain: $R^2 = 0.121$, $F(4,478) = 16.41$, $p < .001$						
(Constant)	2.795	0.060		46.63	< .001	
Veterinary	0.487	0.077	0.311	6.301	< .001	
Environmental	0.404	0.083	0.238	4.853	< .001	Gender, wolf area and place of residence as predictors were excluded from the model.
Hunter in a family	0.258	0.088	0.127	2.939	.003	
Second year	0.172	0.069	0.108	2.470	.014	
Interest to learn (PC III) domain: $R^2 = 0.143$, $F(4,478) = 19.94$, $p < .001$						
(Constant)	3.171	0.093		34.04	< .001	
Environmental	0.639	0.100	0.314	6.379	< .001	
Veterinary	0.428	0.098	0.229	4.361	< .001	Wolf area, place of residence and a hunter in the family as predictors were excluded from the model.
Third year	-0.265	0.083	-0.136	-3.200	.001	
Gender (male)	-0.268	0.083	-0.147	-3.208	.001	
Hunting (PC IV) domain: $R^2 = 0.224$, $F(4,478) = 34.42$, $p < .001$						
(Constant)	3.755	0.101		37.193	< .001	
Environmental	0.548	0.088	0.302	6.239	< .001	
Gender (male)	-0.523	0.071	-0.322	-7.382	< .001	Grade, wolf area and hunter in the family as predictors were excluded from the model.
Veterinary	0.213	0.088	0.128	2.415	.016	
Place of residence	-0.164	0.073	-0.096	-2.231	.026	

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	B	SE of B	β	t	p	Predictors
Knowledge domain: $R^2 = 0.208$, $F(2,480) = 62.996$, $p < .001$						
(Constant)	8.030	0.231		34.816	< .001	Having pets, gender and individual grade students as predictors were excluded from the model.
Veterinary	3.562	0.318	0.520	11.198	< .001	
Environmental	2.105	0.346	0.283	6.087	< .001	

Correlations Between Attitudinal Dimensions and Knowledge

Correlations between every attitudinal dimension and between attitudinal dimensions and knowledge were significant. The highest correlations were found between the "Conservation" attitudinal dimension and all other attitudinal dimensions including the knowledge dimension (Table 5).

Table 5. Correlations between questionnaire dimensions

	Harm	Learn	Hunt	Knowledge
Conservation	.492**	.497**	.568**	.516**
Harm	-	.415**	.299**	.461**
Learn	-	-	.336**	.399**
Hunt	-	-	-	.293**

*Note: Partial correlation coefficients; meaning of asterisks: ** p < .01.*

Differences in Students' Attitude Ratings and Knowledge Scores According to Study Programme and Study Year

According to multiple regression analyses, the educational programme showed to produce the highest differences in student attitude ratings and knowledge scores (Table 4). Those differences are presented in detail in Figure 1, where Kruskall-Wallis test was used to assess the significance of the differences. Differences in attitude ratings and knowledge scores between programmes emerged already at the beginning of the first study year. It can be seen that Agricultural technicians displayed more negative attitudes on all attitudinal dimensions regardless of the study year. The same applied for knowledge. The ratings and scores of Environmentalists technician and Veterinary technician students are more mixed. Namely, Environmentalists technicians oppose more to hunting wolves than Veterinary technicians do. Their interest to learn about wolves is also higher in second and third year of study than is the interest of Veterinary technicians. On the other hand, Veterinary technicians are the most knowledgeable of all, regardless of the study year.

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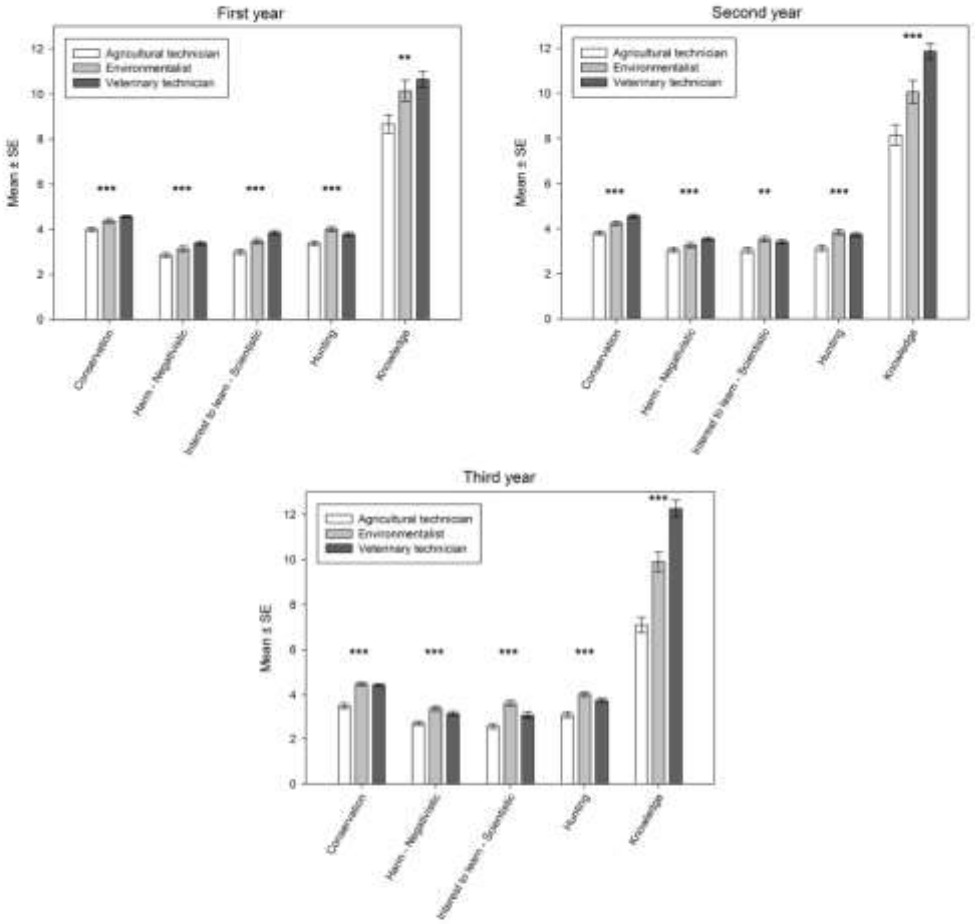

Figure 1. Differences in students' attitude ratings and knowledge scores according to study programme and study year.

Discussion

The research produced results which show no difference between males and females in negativistic attitudes toward wolves. On the other hand, differences in interest to learn and attitudes toward hunting were identified. Having a hunter in one's family resulted in fear reduction among students. The study programme proved to be a factor of great influence; what does not mean that study programme by itself has an influence. There were differences between students of different study programmes in attitudes and knowledge even at the beginning of their study (first year students). Veterinary technician students displayed the most positive attitudes toward wolves and the students of Agricultural technician programme the least positive ones. In the research, no attitudinal differences were noted between students residing in wolf area and those living outside these areas, with the exception of opposition toward hunting. Positive correlations were found between all attitudinal dimensions and between attitudinal dimensions and knowledge.

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Gender

Some authors (i.e. Kellert & Berry, 1987; Musila, Prokop, & Gichuki, 2018) suggest that gender is significant influential factor in the development of humans' attitude toward wildlife species. Different from the research studies that reported more negative attitudes toward wolves among females than males (e.g. Prokop & Tunnicliffe, 2010), which was also explained by women's evolutionary background of antipredatory behaviour and lesser physical abilities (Røskaft et al. 2003), the current research identified no gender-related differences in regards to the fear of wolves. On the other hand, females held more positive attitudes toward wolf conservation than males. Such tendency was also noted in meta-analysis conducted by Williams et al. (2002). Gender-related differences also correlated with the interest to learn about wolves. Male students were less willing to learn about wolves than female students although some research studies report that male students prefer wild species (Lindemann-Matthies, 2005). The results of the present research regarding the interest to learn about wolves are consistent with the findings of Glikman et al. (2012). It can be concluded that individuals (especially females) who hold more positive attitudes toward wolves (e.g. conservation of wolves) will be more willing to learn about these species and probably more readily engage in pro-environmental behaviour (Zelezny, Chua, & Aldrich, 2000).

The results of the present research also show that male students opposed less to hunting wolves than females; this trend may be due to high male's abundance in agricultural part of sample. Similar results were reported in previous research (Treves et al., 2013), exploring the attitudes toward hunting among livestock breeders. Kellert and Berry (1987) reported that women voiced greater opposition to hunting than men. These attitudes may be explained by the fact that females hold more humanistic and moralistic attitudes, and harbour more pronounced anthropomorphic feelings toward large and aesthetic animal species. On the report of these authors, males may oppose less to hunting because of their higher utilitarian and dominionistic attitudes; a will to have control over animals. However, males expressed more favourable attitudes toward conservation of species and the concern for balanced ecosystems. Nevertheless, hunting is important and requires careful orchestration of ecological, social and economic factors in order to establish balance and sustainability in human dominated ecosystems.

A Hunter In the Family

Having a hunter in the family proved to be a factor that reduces the students' fear of harm. Some authors (Williams et al., 2002) argued that members of hunting associations express more positive attitudes toward wolves in comparison to the general public. According to the current research findings, hunters may contribute to fear reduction of wolves among their family members. It seems that having a hunter in the family significantly reduces fear but does not have any effect on any other attitudinal domain, interest to learn or conservation dimension or even on the students' knowledge.

Study Programme

As the differences on all attitudinal domains and in knowledge scores were detected among early first graders between study programmes, it can be concluded, that pupils with less knowledge, less willingness to learn and less opposition towards hunting and more negative attitudes toward wolf conservation decide to become agricultural technicians. Those are presumably the students of different goals with more pronounced utilitarian views. On the other hand, Veterinary technicians are the most knowledgeable as their study programme focuses also on gaining knowledge about domestic carnivores that they were able to apply to questions about wolves. Environmentalists technicians might oppose more to hunting due to their conservationist beliefs. Results of present research, that shows differences in attitudes and knowledge among study programmes, are consistent with the findings of previous research on the attitude toward other large carnivore species (Schlegel and Rupf, 2010). At this point, it is important to acknowledge former attitude formation and amount of knowledge gained that is evidently not limited to formal educational settings. It was confirmed that the utilitarian way of thinking among agricultural technicians contributes to more negative attitudes (Schlegel and Rupf, 2010). Also, the lack of species and ecological knowledge may lead to lower acceptance of large carnivore species. In our case, poor knowledge of Agricultural technician students may very likely be one of the indicators. As in this research, similar negative attitudes toward wolves was found among adult rural residents/farmers (Chavez et al., 2005; Ericsson & Heberlein, 2003) and in the meta-analysis of Williams et al. (2002). The attitudes toward wolves among ranchers/farmers and environmental/

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ISSN 2538-7138 /Online/

wildlife associations in America and Europe show a similar pattern distribution as the current research. Although the present research sample represents upper secondary school students only, the results show that they share similar attitude patterns with the above-mentioned groups. Besides more positive attitudes, Veterinary and Environmentalist technicians express significantly higher interest to learn about wolves than Agricultural technicians.

Study Year (Age)

The results show that the second-year students displayed less fear of harm than the first and the third-year students. The study year also influenced the students' readiness to learn about animals. The third year students expressed the least interest to learn. Prokop and Tunnicliffe (2010) reported that children aged between 10 and 15 years are more familiar with animal species which are not popular. In their research, a wolf was represented as a predator, therefore was treated as unpopular. Large carnivore species are not always treated as a factor of fear but are also admired because of their aesthetics or intelligence (Kellert, 1985a, 1985b). Therefore, they can be also classified as popular. Nevertheless, Prokop and Tunnicliffe (2010) argued that even if the students are more familiar with species that are not so popular, their attitudes toward those species can be negative. This may in part explain more negative attitudes of the first- year students. Some authors (Berninger et al., 2009; Kellert, Black, Rush, & Bath, 1996) argued that more knowledge can enhance the strengthening and reinforcement of already formed attitudes. If they acquired new knowledge of animals during their upper secondary education, the third-year students in our sample should therefore express even more favourable attitudes relative to their counterparts. Surprisingly, the results proved just the opposite. Several authors (e.g. Johnson, 1974; Williams et al., 2002, Prokop & Kubiatko 2008; Binngießer & Randler 2015) found that age increase correlates with more negative attitudes. Similarly, Consorte-McCrea et al. (2016) documented age-dependent decrease of attitude toward maned wolf (*Chrysocyon brachyurus*) among teenagers. The third-year students' lack of interest to learn about wolves may be due to a variety of factors. The reasons for the student's academic amotivation can be self-determined, such as poor academic achievements (Deci & Ryan, 1985). Low interest to learn may be due to ineffective students' learning habits or their negative attitudes toward the subject (Çimer, 2012). Nevertheless, reasons for lacking motivation result from a broader social and not only educational context. "Key social agents", such as friends, parents or even teachers, influence the student's attitudes and even behaviours regarding education (Deci & Ryan, 1985). Therefore, teaching style is of great importance. Nevertheless, interest to learn may be also due to the topic itself (Trumper, 2006; Çimer, 2012).

Place of Residence

Earlier research associate the place of residence with the attitudes toward wolves (Bjerke et al., 1998; Consorte-McCrea et al., 2016; Ericsson & Heberlein, 2003; Karlsson & Sjöström, 2007; Williams et al., 2002), suggesting that the residents who live within wolf areas display more negative attitudes toward wolves than those who live outside such areas. In contrast to these findings, however, the present research produced different results; there were no attitudinal differences regarding living areas. The only exception was that the students residing in wolf areas oppose less to hunting than their counterparts. Krange and Skogen (2007) and Skogen (2001) argued that more hunting support among men is due to their working-class status and rural hunting tradition. To turn rural residents' attitudes to more positive, education may be of great importance. In education, direct experiences with animals are used to promote positive attitudes. According to Tomažič (2008), direct experiences can positively influence the students' attitudes. Consorte-McCrea et al. (2016) reported that seeing maned wolf in zoo can promote conservation support and learning interest even if individual's direct experience from wolf areas was negative. The same may also be true for grey wolf. A survey by Bjerke et al. (1998) pointed to an education-dependent increase of support of wolf conservation among people in wolf territories. The conservation literacy guidelines published by the Society for Conservation Biology (Trombulak et al. 2004) emphasise that "education is most successful when it focuses on developing knowledge, skills, and attitudes in a way that gives people extended direct experience." (p. 1189). If, however, direct experiences with wolves are negative (i.e. damages caused by wolves), it cannot be expected that a person's attitudes toward animals would be positive.

These findings have an important implication for the environmental education of the vocational upper secondary school students, especially those who live in rural areas, or come from family of livestock breeders. The study programmes should encompass not only animal biology but also the strategies to mitigate damages caused by wolves.

Journal of Baltic Science Education, Vol. 17, No. 6, 2018
ISSN 1648–3898 (Print)
ISSN 2538–7138 (Online)

Knowledge

The current research revealed that the average students'knowledge about wolves was fairly limited (average score of only around 43 %). Students lack the knowledge of wolves' ecology the most. Their knowledge scores show that half of them perceive wolves as a threat to people's safety. While in some world regions, wolves' attacks on people have been reported (Linnell et al., 2002), in Slovenia, according to SloWolf (http://www.volkovi.si/), there were no attacks in more than 100 years. The students' belief that wolves are dangerous to people might be the result of watching nature TV channels or even movies where wolves are sometimes presented as dangerous or even bloodthirsty. More research on this topic needs to be undertaken. In previous research (e.g. Dahlgren et al. 1977; Kellert & Berry, 1987), more knowledge of wildlife species among men than women was presented. The present research did not confirm any significant gender–related differences in the respondents' attitude toward wolves. The results indicate that the only factor influencing the knowledge is the study programme. According to Røskaft et al. (2003) less knowledge of large carnivores, especially their behaviour and habits, can be linked with more negative attitudes and conflicts in rural areas. The students' knowledge could therefore be increased with the implementation of programmes, which include wolf-related topics, especially wolves' ecology. Some authors argue that even shorter environmental courses can promote positive attitudes and higher knowledge (Campbell Bradley et al., 1999; Prokop, Tuncer, & Kvasničák, 2007). Kikvidze and Tevzadze (2015) stressed the importance of traditional knowledge, such as appropriate husbandry practices among livestock breeders to reduce wolves' predation. Besides the perceived damage, fear also plays an important role in attitude formation. Johansson and Karlsson (2011) urge that fear reduction may be the most effective, if those interest groups gain knowledge of their own proper behaviour rather than the behaviour of wolves'. For that reason, the agricultural technician programme should include the identified relevant topic. Barney et al. (2005) argued that only positive attitudes do not directly lead to pro-environmental behaviour, if knowledge of species biology is lacking. Morrone, Mancl and Carr (2001) outlined that: "...knowledge and attitudes are important components of environmental literacy, especially if the goal of environmental education is to change behaviour."

Conclusions

The review of the entire sample's attitudinal patterns shows that the upper secondary school students from vocational programmes hold positive attitudes toward wolves in general, but their knowledge is scarce. Neutral attitudes were displayed in fear-related topics, such as fear of being harmed and predation of farm or companion animals. The average of the students also expressed neutral interest to learn. On the question of knowledge, the research produced some interesting results. The most knowledgeable were Veterinary technician study programme students, and the least were the Agricultural technician programme students. The study programme has proved to be an important factor of influence regarding all attitudinal categories and knowledge. The type of the study programme was the only factor having impact on the respondents' knowledge. Although gender was not a factor of influence on "*Knowledge*" domain, it influenced most the attitudinal dimensions. Females held more positive attitudes toward wolves and showed more readiness to learn about them. The study year was also a predictor of interest to learn; where the third-year students showed less willingness to learn. Having a hunter in the family and a place of residence also influenced the respondents' attitudes. A hunter in the family leads to fear reduction and living in rural area diminishes opposition to hunting. The educational programmes should encompass also the wolf topics as the students might be directly involved in species management or conservation practices. Special attention should be focused especially on the Agricultural technician study programme, the students of which hold most negative attitudes and possess the least knowledge. This is of importance because they will probably have the most direct experiences with wolves during their career work, therefore, they should gain more knowledge on species ecology, behaviour and especially practices that promote human-wolf conflicts solutions. Along with the renewed study programmes, future research on the current topic are recommended to further explore and determine the impact of instructions on attitudes and knowledge about wolves.

Journal of Baltic Science Education, Vol. 17, No. 6, 2018
THE VOCATIONAL UPPER SECONDARY SCHOOLS STUDENTS' KNOWLEDGE AND THEIR ATTITUDES TOWARD WOLVES
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ISSN 1648–3898 (Print)
ISSN 2538–7138 (Online)

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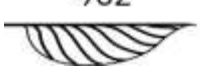

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THE VOCATIONAL UPPER SECONDARY SCHOOLS STUDENTS' KNOWLEDGE AND THEIR ATTITUDES TOWARD WOLVES
(P. 918-934)
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Received: *June 25, 2018* Accepted: *October 20, 2018*

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2.2 OHRANJANJE VOLKOV PREKO IZOBRAŽEVALNIH DELAVNIC: KATERA UČNA METODA JE NAJUČINKOVITEJŠA?

Znanstveno delo 2:

Oražem V., Tomažič I., Kos I., Nagode D., Randler C. 2019. Wolves' conservation through educational workshops: which method works best? Sustainability, 11: 1–17

Prookoljsko izobraževanje je pomemben družbeni cilj, katerega osrednja vloga je spodbujanje ohranjanja biotske raznovrstnosti po vsem svetu. Pri spoznavanju živali je neposredna izkušnja izrednega pomena, saj vpliva na stališča in znanje udeležencev. V primeru velikih zveri pa je vključevanje neposredne izkušnje praktično nemogoče. Izjema je opazovanje teh vrst v lokalnih živalskih vrtovih. Smiselno je, da pouk v šolah vključuje tudi realne biološke materiale, saj ti povečajo interes za učenje. Raziskovali smo, kako je mogoče pozitivno vplivati na stališča in povečati znanje dijakov o volkovih v treh različnih učnih kontekstih: (a) s konvencionalnimi predavanji (v učitelja usmerjen pristop), (b) s predavanji v kombinaciji s praktičnimi dejavnostmi v šolskem okolju (v dijake usmerjen pristop) in (c) s predavanji s praktičnimi dejavnostmi na univerzi (v dijake usmerjen pristop). V raziskavi so sodelovali dijaki splošne (program gimnazija) in srednje strokovne šole (program veterinarski tehnik). Pred poukom in po njem smo z vprašalnikom preverjali stališča in znanje. Dijaki so izkazali pozitivna stališča do volkov, pri čemer je imelo največji vpliv njihovo predznanje. Znanje o volkovih se je med poučevanjem izboljšalo ne glede na pristop poučevanja. Največji vpliv na stališča in znanje smo opazili v univerzitetnem (izvenšolskem) okolju. Ker je bilo poučevanje v tem okolju najproduktivnejše, se tovrstna izvedba priporoča tudi pri nadaljnjih prookoljskih izobraževalnih aktivnostih.

sustainability

MDPI

Article

Wolves' Conservation through Educational Workshops: Which Method Works Best?

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Received: 31 January 2019; Accepted: 19 February 2019; Published: 21 February 2019

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Abstract: (1) Background: Conservation biology education is an important societal goal, targeting the worldwide promotion of biodiversity conservation. When learning about animals, direct experience poses an ideal opportunity to influence the participants' attitudes and knowledge. However, in the case of large carnivores, direct experiences are scarcely possible, except at local zoos. School teaching should therefore rely on preserved materials, which are still originals. (2) Methods: Here, we investigated how students' attitudes and knowledge regarding wolves can be improved in three different teaching contexts: (a) through conventional lectures, (b) through lectures combined with hands-on activities in the real classroom setting, and (c) through lectures with hands-on activities at the university. Students from general and vocational (veterinary) upper secondary school participated in the study. Attitudes and knowledge were tested before and after the teaching. (3) Results: Students displayed positive attitudes toward wolves and their prior knowledge had the highest influence on attitude ratings. Knowledge about wolves improved during teaching regardless of the teaching approach. The highest influence on attitudes and knowledge was observed in the university setting. (4) Conclusion: The university setting evidently produces the strongest effect so it is a recommended approach when designing conservational topics.

Keywords: achievement; attitude; conservation; educational workshops; teaching methods; wolves

1. Introduction

1.1. Conservation Biology and Socio-scientific Issues Regarding Large Carnivores

Lack of knowledge and education in general are the main drivers of environmental problems [1]. Accordingly, conservation biology education was proposed to be one of the main societal goals [2], targeted at the worldwide promotion of biodiversity conservation [1]. Within the framework of biodiversity, large carnivore conservation is especially challenging because of extensive socio-scientific issues associated with it [3] and therefore essential in terms of conservation [4]. In management and conservation efforts of large carnivores, all three "fixes", proposed by Heberlein [5], should be considered. These fixes refer to cognition, technology, and structure. A "cognitive fix" can be achieved through education, a "technological fix" by adopting various practices (e.g., prevention measures and hunting), and a "structural fix" by regulated legislation. Protective legislation, positive attitudes and practices supporting human-large carnivore coexistence are therefore important factors influencing large carnivore conservation [3]. To influence attitudes supporting large carnivore conservation efforts,

which are considered as behavior predictors, the "cognitive fix" should be addressed, even if it is a long-term process [5].

1.2. Large Carnivores of Slovenia

Slovenia is inhabited by three large carnivore species: brown bear (*Ursus arctos* L.), wolf (*Canis lupus* L.), and Eurasian lynx (*Lynx lynx* L.). The most abundant and numerous species is the brown bear, with approximately 750 individuals [6] with one of the world's highest reproduction rates.

Wolves are the second most abundant large carnivore species. National population monitoring [7] showed that the population consists of approximately 75 individuals. The population status is defined as favorable [7]. During the season of 2017/2018, 14 wolf packs were identified, four out of which are transboundary (shared with Croatia). Wolf population in Slovenia is slowly growing, which is mainly due to spatial distribution, pack number increases and greater abundance within single, vital packs [7]. Wolves are known for their ability to quickly adapt to live in human-dominated areas [3]. For that reason, human-wolf interactions are inevitable. Regarding the constant dynamics of such interactions, interventions supporting coexistence are therefore indispensable [8–10].

The rarest and most threatened large carnivore species in Slovenia is the Eurasian lynx. The population of approximately 15 individuals [11] is locally nearly extinct, mainly due to inbreeding [12,13]. In order to save this species from local extinction, non-related individuals from a viable Carpathian population will be translocated to Slovenia within the LIFE Lynx project (https://www.lifelynx.eu/).

1.3. Teaching about Animals in Schools

The majority of studies focused on assessing knowledge, attitudes, and acceptance of wolves in an adult population and concerning different stakeholder groups [14–17]. There are only a few studies where authors assessed a younger adolescent population [18–21]. One previous study [21] of attitudes and knowledge of vocational upper secondary school students (agricultural, veterinary, and environmental technician programs) revealed general positive attitudes to, but limited knowledge about wolves. Agricultural technicians' attitudes showed a more utilitarian view and their knowledge was the most deficient. The authors therefore emphasized the importance of renewed study programs focusing on current socio-scientific issues, especially good practices supporting human-wolf coexistence. To increase educational efficiency in regards to conservation, the study programs should focus on developing attitudes and knowledge through direct experiences [2]. Besides gaining theoretical knowledge of the species, direct experiences are believed to positively affect attitude formation [22]. In the case of large carnivores, this approach is more complex. Observation of free-ranging large carnivores is very difficult because of their natural wariness and consequential avoidance of people. Some human dimensions studies, [14,15,23,24] showed that living in a wolf area or near their territories, in potential direct contact with wolves, are related to more negative attitudes. A general public survey in Sweden [25] also reported that direct experiences with wolves and brown bears lead to lower acceptance of those species. In many cases, those direct experiences may cause the development of more negative attitudes because of economic loss and emotional pain (e.g., livestock depredation). On the other hand, direct experiences of large carnivores in zoos (e.g., observing the animals in enclosures) can be effective in positive attitude formation [26]. Besides observing animals in zoo settings, direct experiences could also be gained within outdoor learning activities, which allow students to experience large carnivore habitat and see the signs of their presence (e.g., footprints, hairs, scats). The students can achieve higher affective learning in the presence of living animals [27] since their presence greatly affects the students' emotions and motivation [28]. Similarly, teaching by using living animals can positively influence the students' attitudes and knowledge [22,29,30]. In the case of large carnivores, preserved specimens can represent a good replacement of the presence of a living animal. Sherwood Jr. et al. [27] used preserved specimens as a teaching object and reported that students can achieve both, short- and long-term knowledge through indirect experiences as well. With the exception of the affective dimension of learning, no differences in learning outcomes were identified when using either living

animals or preserved specimens. The results of similar studies were summarized by Hummel and Randler [28] in their meta-analysis. They reported that teaching with substitutes of living animals can also be very productive. In the case of wolves, it is not possible to bring living animals into the classroom so a substitution with other, original materials should be the best option.

1.4. Integrating Large Carnivore Education into Slovenian School Context

In lower secondary school, biology-related topics are covered within two subjects: Science (for sixth and seventh graders) and Biology (for eighth and ninth graders). Only the seventh graders learn about animals (Science) while the ninth graders learn about ecology and habitats in general (Biology). For those two groups, topics on large carnivores can be aligned directly with the present curricula. In the upper secondary school biology curricula, the teaching about wolves (large carnivores) can be incorporated into the topics of cell biology (such as cells, genes, and inheritance), structure and function of organisms, evolution, ecology, biodiversity, ethology, human and natural sources, and biology as a science. So far, the topics about large carnivores, especially practices regarding co-existence, have been under-represented.

1.5. The Present Study

One of the main goals of conservation biology is to raise general public awareness about local species and the loss of biodiversity [2]. Although, conservation biology projects funding's are frequently assigned to educational actions, like the one in the present study, such actions are scarcely evaluated. Moreover, in a case of large carnivores (mammals), there is a need to promote a sustainable coexistence [31]. Large carnivore species (wolf, brown bear, and Eurasian lynx) in Slovenia live in human-dominated landscapes leading occasionally to negative interactions, [32].

To raise awareness and gain more knowledge regarding those issues among adolescents, teaching materials and general information about wolves were developed within the project SloWolf (Conservation and surveillance of the conservation status of the wolf (*Canis lupus*) population in Slovenia) [33]. These teaching materials were aligned with the upper secondary school biology curricula. In order to determine whether the teaching materials are appropriate for teachers' use, we assessed their effect on the students' attitudes to and knowledge about wolves in different learning contexts, i.e., the traditional teaching, teaching with hands-on experiences in school and teaching with hands-on experiences at the university.

A before/after-control/intervention group design with an intervention and a control group was implemented to study the effectiveness of learning and attitude change about wolves. Three conditions were compared: conventional lecture-based teaching at school (School condition—teacher-centered); practical teaching using the developed teaching materials at the respective school (School condition—practical); and a teaching sequence using teaching materials in an out-of-school setting (University condition). The latter two teaching approaches were identical in content and form of teaching except for the location (for a detailed description see the Materials and Methods section). The unique aspect of the present study is that the same teaching intervention was used in school and out-of-school to determine which teaching condition performs better, while retaining a quasi-control group taught by the conventional method (teacher-centered teaching). It should be noted that the latter teaching method is still prevailing in Slovenian schools.

The present study aimed to: (1) assess the general upper secondary school (Gimnazija) and vocational (veterinary) students' attitudes and knowledge regarding wolves and (2) verify whether their attitudes and knowledge change as a consequence of attending practical workshops regarding wolves. Several independent variables were included in the data analysis, such as students' gender, type of school, students' place of residence (within constant, occasional, or no wolf presence area), having a hunter in the family, breeding sheep/goats, and encountering a live wolf in nature. These variables were assessed within pre-test analysis.

Hypothesis 1. *Students' learning achievement regarding wolves is higher after treatment. This applies to all studied conditions (1a), although the highest effect is expected within a university setting (1b).*

Hypothesis 2. *Students' attitudes are more positive after treatment (2a). This applies to all studied conditions, although the highest effect is expected within a university setting (2b).*

Hypothesis 3. *Differential variables account for variance in the post-test scores, for example, the amount of knowledge, gender, study program, having a hunter in the family, breeding sheep/goats at home, and encountering a live wolf in nature will affect students' attitude ratings before any teaching will take place (3a). We predict that considerable differences in the students' attitude ratings will be found for the following variables: amount of knowledge and the study program.*

Hypothesis 4. *The study program will produce the greatest differences in the amount of knowledge as the students from veterinary profession learn about dogs either within their study program, or possess more knowledge than their counterparts due to their interest in animal biology.*

2. Materials and Methods

2.1. Sample

The initial sample consisted of 331 students from two schools. Only the students who participated in the pre- and post-testing and during teaching were included in the final sample ($N = 302$). Students were evenly distributed across two schools. The sample was composed of 187 (61.9%) students from general upper secondary school (Gimnazija - GUP) and 115 (38.1%) students from vocational upper secondary school (VUP) (Age: $M_{GUP} = 16.33$, $SD = 0.94$; $M_{VUP} = 16.16$, $SD = 0.77$). It included 43.4% of male and 56.6% of female students. The majority of the students lived outside the wolf occurrence (70.9%), 19.5% within occasional wolf occurrence and only 7.3% within constant wolf occurrence.

Prior to the study, the teachers were informed about the teaching material that was especially developed for this purpose. The teachers were invited to attend the workshop, where the teaching materials were presented (Figure 1). The two schools and their biology teachers were then informed about the need for a student sample for testing the materials in practice. The testing took place from the middle to the end of the year 2013. The students' participation was voluntary and the results did not affect their grades. Since the testing was anonymous and the study was of educational nature, the ethical approval in Slovenia was not needed. The inclusion criteria required that the students were not given any other lessons about large carnivores prior to or during the intervention.

2.2. SloWolf Project and Preparation of Teaching Materials

The goal of the SloWolf project was the long-term conservation of the wolf population, its main prey and habitats in Slovenia, and improvement of their coexistence with humans [34]. The project included also the preparation of the teaching manual [35]. As the original version is in the Slovenian language, the content of teaching materials is presented in brief.

- The lecture about wolves (biology of wolves, systematics, characteristics of wolves, wolf habitat, (social) behavior of wolves, status of wolves in Slovenia, howling, winter tracking, telemetry, CMR—capture mark recapture method, molecular genetics (STR—short tandem repeats analysis), wolf conservation, ecological importance of wolves and misconceptions about wolves.
- Practical work using realia (skulls, fur and footprints-casts) for learning about large carnivore anatomy and feeding.
- Non-invasive genetic sampling-using molecular genetics techniques for DNA fingerprinting in order to estimate wolf population size and to study genetic relationships within and between wolf packs (STR analysis worksheet).
- Estimating the wolf population size using CMR method (*not included in the study*).

- Forming attitudes toward wolves through role-playing (i.e., environmentalist/conservation biologist, sheep breeder, hunter, politician) (*just briefly covered in the discussion section of each lecture*).

The development and preparation of teaching materials was financed through the SloWolf project. The evaluation of the teaching materials was conducted as part of the research activities at the Department of biology, Biotechnical faculty, University of Ljubljana.

Figure 1. Presenting teaching materials to teachers: (**a**) A lecture about wolves; (**b**–**d**) Working at the individual workstation (footprints and casts, skulls, and fur; respectively).

2.3. *Study Design*

The study encompassed a pre-test, the teaching intervention and a post-test (Figure 2). As the purpose of the study was also to test which of the conditions, teacher-centered instruction, working at workstations or an out-of-school setting contributes most to the students' knowledge about and attitude towards wolves, the sample was divided into three groups, [36,37]. The teacher-centered School condition and the workshop School condition groups were from the general upper secondary school (School 1). The University condition group of students was a mixed group of vocational and general upper secondary school students (School 2), who came to the university as separate groups. In order to avoid the teacher effect [38], all the students were taught by the same person, a pre-service teacher, experienced in conducting similar workshops and teaching in schools. The teacher-centered instruction was performed as a lecture about the wolf topics mentioned above, with the addition of a worksheet about non-invasive genetic sampling that the students had to complete. In a workstation setting at school and at the university, the students were first instructed about the tasks at individual workstation and then worked independently in groups, using worksheets. A different topic was presented at each station. When the allocated time (15 min) ended, the correctness of students' notes and findings were discussed with the pre-service teacher. Similarly to the teacher-centered instruction, worksheets about non-invasive genetic sampling were distributed to students to complete. A short lecture followed on the topics not covered at the workstations. All the school teaching was incorporated into regular biology classes. Workshops at the university were implemented as part of a Science Day.

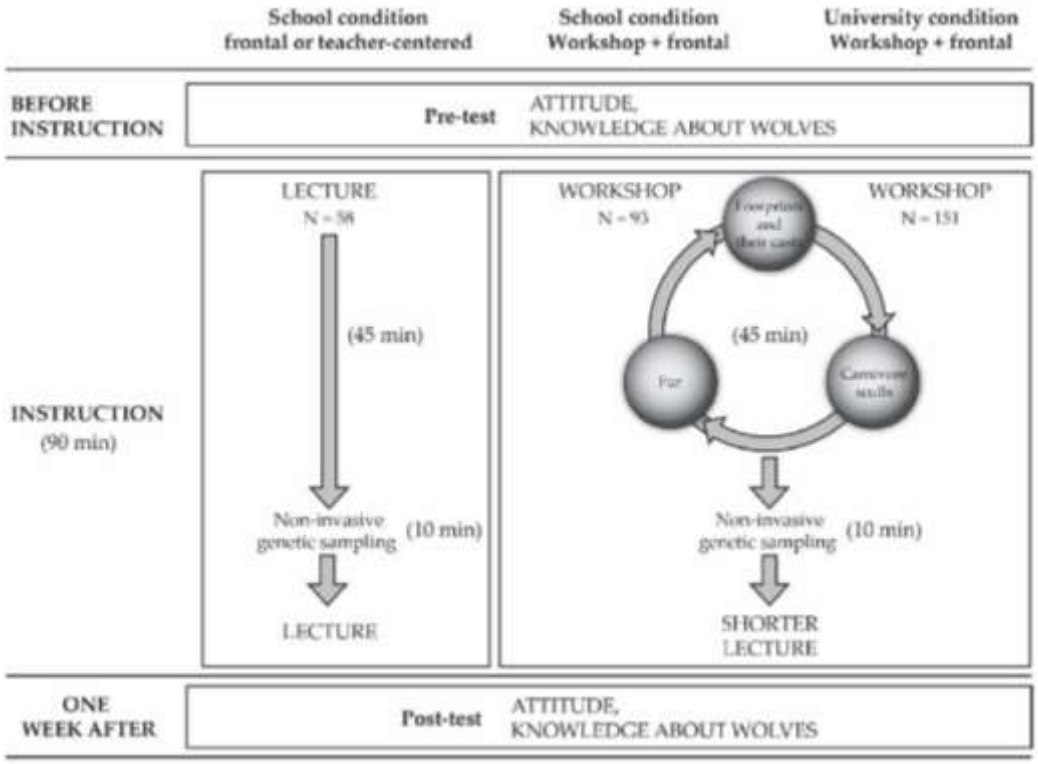

Figure 2. Study design.

2.4. Measures

A questionnaire was developed to assess the students' attitudes towards and knowledge about wolves. The first part of the questionnaire consisted of questions about the student's socio-demographics. Attitudinal items that were selected for the present analysis inquired about the students' (1) willingness to learn about wolves, (2) acceptance (fear) of wolves and (3) views regarding wolves' conservation in Slovenia. The terms are similar to those frequently used also for different animals or animal groups, i.e., [19,39–43]. There were 12 attitudinal items included.

First, the principal component analyses (PCA) with oblimin rotation were conducted in order to assess whether the selected items would fit into different attitudinal dimension (principal component). Eigen values >1 were used for a final solution. PCA analysis was conducted for pre- and post-test questionnaire delivery. Since the item A12 ("*Wolves should not be near human settlements.*") failed to load on any dimension in one of the initial PCA analyses, it was excluded from the final analyses. The final PCAs were conducted on the remaining 11 items. Kaiser–Meyer–Olkin (KMO) measure of the sampling adequacy test and Bartlett's test for sphericity were used to assess the appropriateness of using PCA on this dataset. Critical KMO value of > 0.70 [44] and minimum loading of at least 0.40 were used [45].

In addition to exploratory analysis, a confirmatory factor analysis was also applied in both, pre- and post-test using AMOS 25 (SPSS, IBM Germany, Ehningen). In the first round, we fitted the pre-test data and then checked the same model with the post-test data. The model fit was based on several recommended criteria [46], the comparative fit index (CFI > 0.90), the Tucker–Lewis index (TLI > 0.90), the root mean square error of approximation (RMSEA < 0.06 was acceptable, between 0.08 and 0.10 was mediocre, and >0.10 was a poor fit) and the CMIN/df (minimum discrepancy divided by its degrees of freedom; which should be close to 2, but below 5).

The students' knowledge of wolves was assessed by the third part of the questionnaire, using 12 true/false statements and nine multiple choice questions related to wolf biology and wolf conservation.

For each question, a "Don't know" option was added. Thus the students' possibility of guessing was minimized. The summed score of correct answers (maximum = 21 points) was used either as a dependent or independent variable. The list of knowledge items can be found in [21].

2.5. Data Analysis

Raw data from the questionnaires were retyped into the computer program Microsoft Office Excel and later transferred to the program SPSS (SPSS, IBM Germany, Ehningen). First, the principal component analysis (PCA) and confirmatory factor analyses (CFA) were applied in order to reduce the number of attitudinal dependent variables, to extract meaningful principal components (PCs) and confirm the suitability of the factor structure.

Extracted PCs from attitude part of the questionnaire and summed knowledge scores were used as dependent variables, which were analyzed according to selected independent variables: gender, school, students' place of residence (within constant, occasional, or no wolf presence area), having a hunter in the family, sheep/goat breeding, and encountering a live wolf in nature. Gender, school, and students' place of residence were treated as fixed factors in General Linear Model (GLM) analysis, while knowledge was treated as a covariate. Due to the small number of students that reported having a hunter in the family, breeding sheep/goats and encountering a live wolf in nature, those variables were not included in GLM analysis. Summed knowledge score was also used to categorize students to low, middle, and high achievers (low achievers summed score $< M - 1SD$; middle achievers summed score within $M \pm 1SD$ and high achievers summed score $> M + 1SD$) and those categories were used to compare the students' attitude scores according to their achievement. All statistical procedures were conducted using SPSS 20.0 software and AMOS 25 (SPSS, IBM Germany, Ehningen).

3. Results

The results are presented in three parts. In the first part, the results of Exploratory and Confirmatory Factor Analyses are displayed. They are followed by the results of the analyses of the students' attitudes and knowledge on pre-test according to the selected independent variables. The third part of the results reveals the effect of different teaching conditions on students' attitudes and knowledge.

3.1. Results of Exploratory and Confirmatory Factor Analyses Regarding Attitudes

The results of both PCA analyses are presented in Table 1. Both pre- and post-test Kaiser–Meyer–Olkin measure of the sampling adequacy test and Bartlett's test for sphericity show the appropriateness of using PCA on this dataset. The KMO values exceeded the critical value of 0.70 and item loadings > 0.40 were found. PC I was named "*Learning*", PC II "*Acceptance (fear)*", and PC III "*Conservation*". Cronbach αs for the total scale were 0.85, both for pre and post-testing. Also, Cronbach αs were satisfactory for the first two PCs (both above 0.69). Cronbach α for PC III was low, ranging from 0.60 to 0.66. Its eigenvalue on a pre-test according to parallel analysis was lower than the corresponding random eigenvalue (1.15), however, its eigenvalue on post-test was above the corresponding random eigenvalue. Lower scores on the "*Acceptance (fear)*"–dimension present more negative attitude due to the reversed negative wording items.

The posited three-factor structure of the model did not have an acceptable fit (Figure 3). Modification indices suggested to allow covariances between the error terms e1 and e2 and e9 and e10. Both were loading onto the same latent construct. After allowing these covariances in the pre-test, the model received acceptable fit values. CMIN/df was 2.697, TLI 0.922, CFI 0.945, and RMSEA was 0.075 (with 0.058 as lower and 0.093 as upper confidence limits). The post-test data already produced acceptable fits (CMIN/df = 3.299, TLI = 0.899, CFI = 0.924, and RMSEA = 0.087 (CI from 0.071 to 0.104)), but indices improved when the same structure was applied as in the pre-test (CMIN/df = 3.044, TLI = 0.910, CFI = 0.936, and RMSEA = 0.082 (95% CI from 0.066 to 0.100).

Table 1. Principal component analysis with an oblimin rotation of items to the individual attitudinal dimension.

Item	Pre-Test PCs			Post-Test PCs		
	I	II	III	I	II	III
Interest to learn						
I would like to know how wolves evolved. (A02)	0.851			0.868		
I would like to learn about different habitats of wolves. (A01)	0.829			0.769		
I like to read about wolves. (A03)	0.778			0.819		
I like to watch popular science broadcasts about wolves. (A04)	0.758			0.745		
Harm – Acceptance						
I would be afraid walking through the forest, if I knew that wolves lived there.* (A06)		0.905			0.831	
I would camp only where there are no wolves.* (A07)		0.788			0.818	
I am afraid of wolves.* (A05)		0.705			0.815	
I would accept the wolf presence in forests near my neighborhood. (A08)		0.596			0.575	
Conservation						
There is no need to preserve wolves in Slovenia because they live elsewhere in Europe.* (A09)			0.801			0.718
In Slovenia, wolves should be preserved for future generations. (A10)			0.737			0.767
In Slovenia, wolves' abundance should increase. (A11)			0.441			0.731
Kaiser–Meyer–Olkin (KMO)		0.844			0.843	
Bartlett's test for sphericity		$\chi^2 = 1202.74$, $df = 55$, $p < 0.001$			$\chi^2 = 1257.57$, $df = 55$, $p < 0.001$	
Cronbach's α (for included 11 items on pre-test and post-test was 0.85)	0.84	0.79	0.60	0.84	0.81	0.66
Eigenvalues	4.39	1.65	1.11	4.49	1.51	1.22
Explained variance	39.95	14.96	10.10	40.84	13.71	11.07
Mean	3.27	3.30	4.23	3.25	3.58	4.31
Standard deviation	0.92	0.89	0.64	0.94	0.92	0.69

Note: * - reversed items; Principal component loadings over 0.40 are presented.

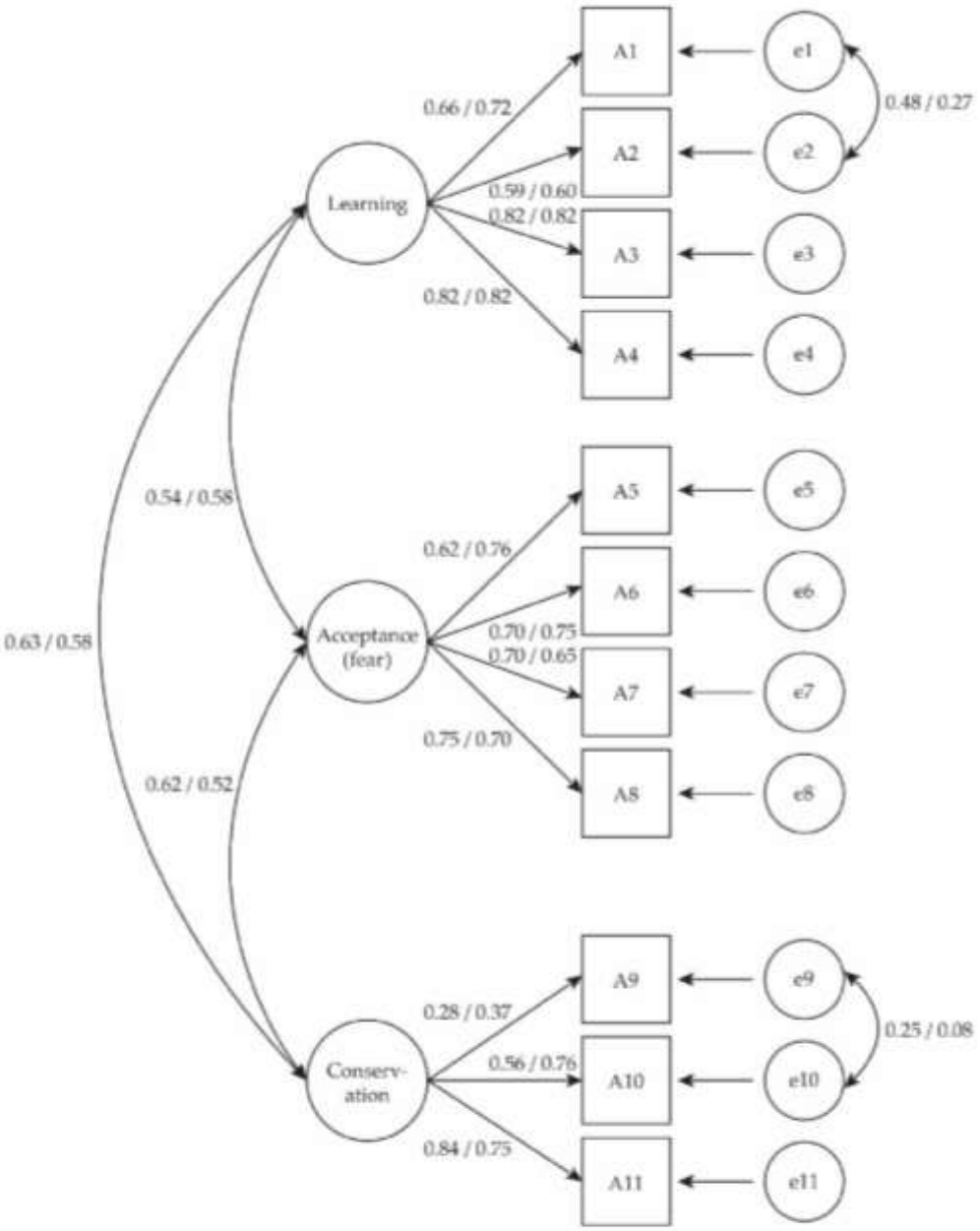

Figure 3. The results of Confirmatory factor analyses. Left values on the arrows show pre-test and right values post-test results of confirmatory factor analyses (CFA).

3.2. *Students' Attitudes and Knowledge on a Pre-Test*

3.2.1. Results of GLM Multivariate Analysis

Variables that were included in GLM (multivariate) statistics: Knowledge as covariate, and as fixed factors: gender, school, and wolf presence (Table 2). Gender and wolf presence variables did not produce any significant effect on students' attitude ratings. The effect was observed for Knowledge and School variables only. There were no interactions found between independent variables.

Table 2. General Linear Model (GLM) analysis of independent variables effect on students' attitude ratings.

Effect	Wilks' Λ	*F*	Hypothesis df	Error df	*p*	Partial η^2
Intercept	0.294	224.056	3	280.0	< 0.001	0.706
Knowledge	0.698	40.448	3	280.0	< 0.001	0.302
Gender	0.988	1.164	3	280.0	0.324	0.012
School	0.963	3.629	3	280.0	0.013	0.037
Wolf presence (home town)	0.976	1.121	6	560.0	0.349	0.012

3.2.2. Differential Effects of Knowledge, Gender, School, and Wolf Presence

The results show that Knowledge had the greatest effect on students' attitude ratings (Kruskal–Wallis; all $p < 0.001$; Figure 4a). School also had a great influence on students' knowledge and attitudes (Mann–Whitney; all $p < 0.001$; Figure 4c). Gender and wolf presence did not affect the students' achievement (Figure 4b, d). However, ratings related to gender affected students' attitude ratings regarding "Learning" about animals, where female students were more interested in learning about wolves than male students (Mann–Whitney: $Z = 2.18$, $p = 0.029$; Figure 4b). Statistically significant differences in students' attitude ratings related to wolf presence were found in two attitudinal dimensions, "*Learning*" about animals and "*Acceptance (fear)*" of animals (Figure 4d). Thus, the students who live within persistent/permanent wolf home ranges displayed the most positive attitudes (Kruskal Wallis: $\chi^2 = 9.12$, $df = 2$, $p = 0.010$ and $\chi^2 = 6.45$, $df = 2$, $p = 0.040$, respectively).

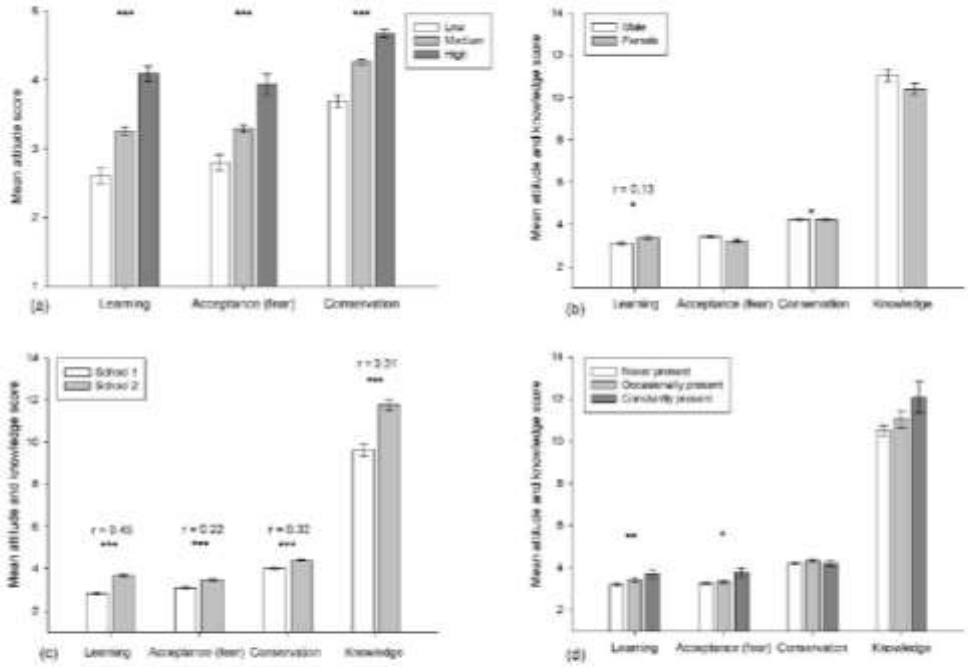

Figure 4. The effect of: (**a**) students' knowledge (achievement) on their attitude ratings; (**b**) gender, (**c**) school, and (**d**) wolf presence on students' knowledge and attitude ratings.

3.2.3. Differential Effects of Having a Hunter in the Family, Breeding Sheep, and Experiencing Live Wolves in Nature

Variables that were excluded from the GLM analysis due to the small sample size were: "*Do you have a hunter in your family?*", "*Are you breeding sheep/goats at home?*", and "*Have you ever seen a wolf in nature?*". Only 44 (14.6%) students reported having a hunter in the family, 13 (4.3%) reported that they are breeding sheep at home and 18 (6.0%) reported seeing a wolf in nature. Only the students

enrolled in the veterinary study program (n = 115) reported that they are sheep breeders at home (n = 13). For the latter variable, the achievement and attitude ratings only within this group was calculated. The students who confirmed the presence of a hunter in the family and seeing a wolf in nature were equally distributed among the general and vocational school sample and the statistics were calculated for the whole sample. Figure 5 shows students' attitude ratings and knowledge scores for these variables. None of these variables affected the students' achievement. There were only two statistically significant differences with the small effect size found in the students' attitude ratings: in the students' interest to learn about animals related to having a hunter in the family (Mann–Whitney: $Z = 2.65$, $p = 0.008$; Figure 5a) and the acceptance of wolves related to experiencing a live animal in nature (Mann–Whitney: $Z = 2.59$, $p = 0.010$; Figure 5c). Having a hunter in the family and experiencing a live wolf in nature positively affected students' ratings.

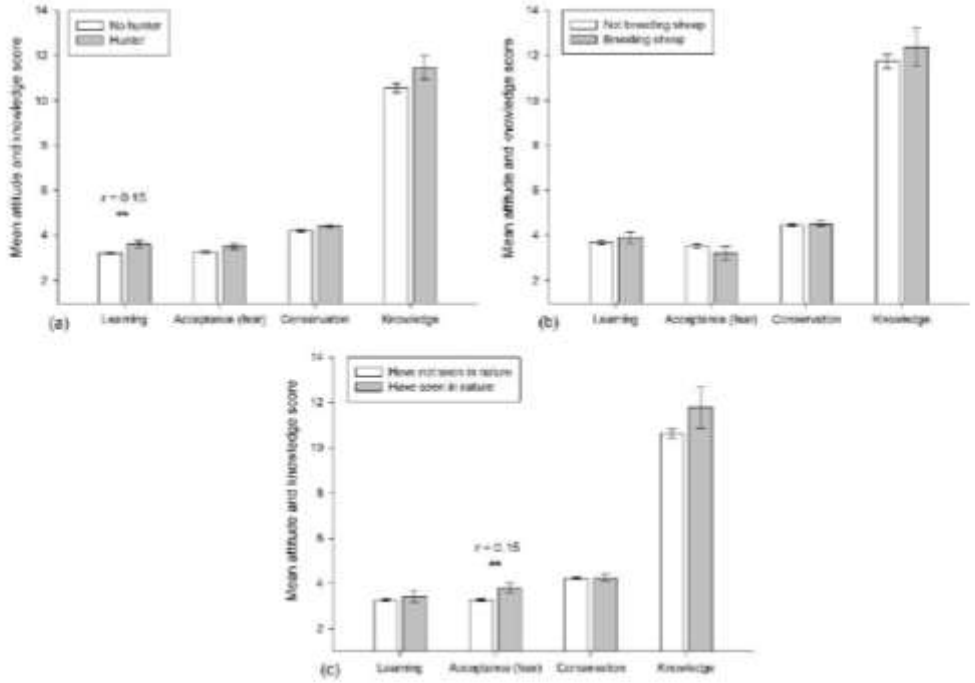

Figure 5. The effect of: (**a**) having a hunter in the family, (**b**) breeding sheep/goats at home, and (**c**) having seen a live wolf in nature on students' knowledge and attitudes.

3.3. *Students' Attitudes and Knowledge as a Result of Teaching*

The results of different treatments/teaching situations had influenced the students' attitudes and achievement (Figure 6). Students from the University group (School 2) displayed the most positive attitudes and the highest knowledge already at the pre-test. Similarly, the School lecture and the School workshop groups did not differ significantly in attitudes and knowledge neither in the pre- nor in the post-testing (Mann–Whitney; all $p > 0.05$). The differences were found between School lecture vs. University workshop groups and School workshop vs. University workshop groups (Mann–Whitney; all $p < 0.01$). The only variable that did not differ between pre- and post-testing within the same groups was the students' willingness to learn about wolves. Their attitudes regarding the latter remained the same in all treatments (Figure 6a). On "*Acceptance (fear)*" attitudinal dimension, students of the School lecture and University workshop groups displayed more positive attitudes after the instruction (Figure 6b). Only the students of the School lecture group displayed more positive attitudes towards conservation of wolves in Slovenia (Figure 6c). Nevertheless, the students of all three groups displayed

significantly higher learning achievement after the instruction (Figure 6d). The highest effect was recorded within the University workshop group of students.

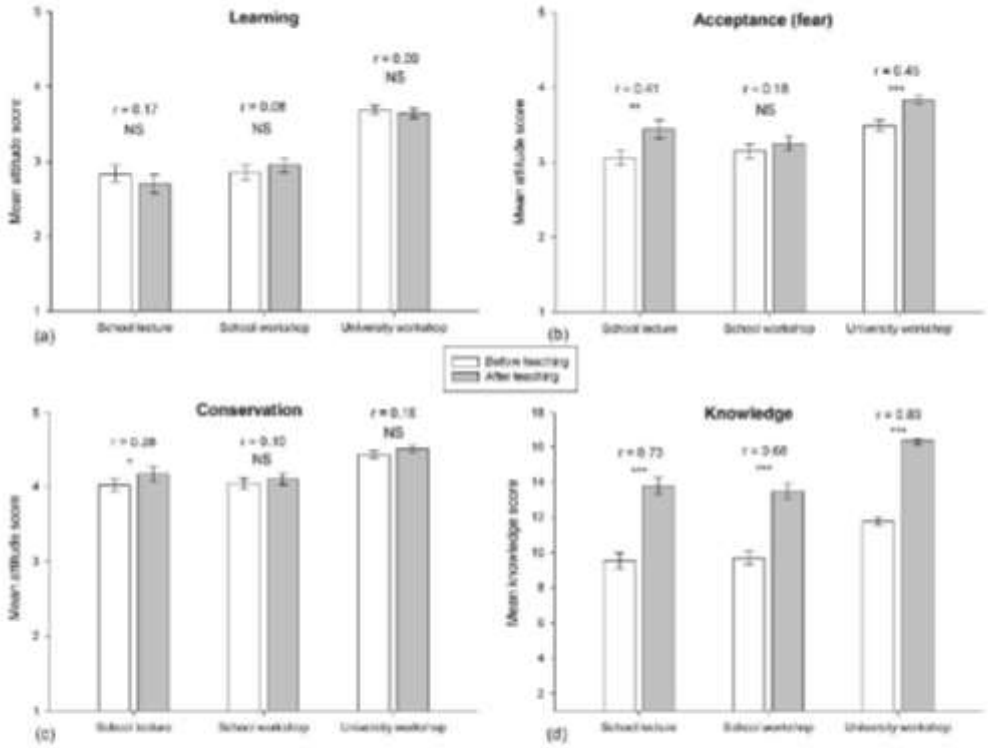

Figure 6. The effect of different learning conditions on students' attitudes and knowledge.

4. Discussion

Attitudes and Knowledge before Treatment

In contrast to previous research [19,47–49], the present study showed no significant effect of gender on students' attitudes in general. However, the relation between gender and attitude ratings was found only in regards to willingness to learn. Female students were slightly more interested to learn about wolves than males, which is consistent with previous research [21,50].

In contrast to the general belief that wolf presence arouses more negative attitudes in humans [14,15,23,24,51], the present study showed no relationship between living in a wolf area and general negative attitudes. Living in a wolf area positively affected students' attitude ratings regarding willingness to learn and acceptance of wolves. The attitudes of the students who live in areas with constant wolf presence were the most positive. General beliefs or negative attitudes from wolf areas can be linked to negative direct experiences with wolves, such as damages to human property. However, Consorte-McCrea et al. [51] argued that direct experience with animals, in their case maned wolf (*Chrysocyon brachyurus*), in zoo settings (observing the animal) can influence attitudes positively even if the person's previous direct experiences were negative. In spite of the fact that wolf presence was linked to only two attitudinal dimensions, the findings of the present research suggest great opportunity to work with younger generations in rural areas to enhance coexistence and wolf conservation for the future. Neither gender nor wolf presence influenced the students' knowledge about wolves. It would be informative to evaluate other areas in Europe with wolf presence in this respect.

Results of the present research indicate that knowledge influences attitudes to a greater extent, which is consistent with previous research [21,48]. Students with the highest amount of knowledge

expressed significantly more positive attitudes than their counterparts. Kellert [52] already proposed that education is one the most influencing factors regarding the formation of pro-environmental attitudes. When using knowledge as a prerequisite to more positive attitude formation, education activities should be planned carefully. Some authors [53] pointed out the importance of science knowledge. According to their findings, factual knowledge may lead to more public support for science and technology topics. On the contrary, subjective knowledge may influence support negatively. Nevertheless, both knowledge dimensions in their study influenced attention to the media reports positively. The impact of subjective dimension was even more significant. Not just the attention to the media reports, also attention to the learning topics may be influenced by different knowledge dimensions. Topics of wolves, as charismatic and also predator species, can quickly capture the students' attention. Nevertheless, the support of wolves and their conservation can be influenced either positively or negatively by the students' previous subjective knowledge. Røskaft et al. [54] argued that insufficient knowledge regarding wolf ecology end ethology can influence attitudes negatively. Along with the previously mentioned learning topics, learning about proper human behavior [55] and practices regarding wolf damage prevention [56] should be considered.

Besides knowledge, the students' attitudes were significantly influenced by the school type as well. The type of school had an impact not only on attitudes but also on the amount of knowledge. The students from School 2 came from veterinary and general upper secondary study programs and did not differ in knowledge and attitudes. It can be concluded that the latter students might have been influenced by the other (veterinary) school programs from the same school. Both groups of students were taught by the same teachers and met regularly, which could have led to knowledge transfer. The fact may be explained by the interests of students who decide to study in this type of school (Biotechnical center). The results show that students from School 2 possessed more knowledge than their counterparts from School 1. The findings of the previous research [21] highlighted extensive knowledge and support of students enrolled in such program regarding wolves. Correlation between educational background, knowledge, and attitudes was also corroborated by other research [48].

Other differential factors, such as having a hunter in the family, breeding sheep, and experiencing live wolf in nature, had no effect on the respondents' learning achievement and had only lesser influence on attitudes. The students who reported having a hunter in the family, expressed more interest to learn about wolves. Research of hunters' attitudes towards wolves can be contradictory. Some findings [23], present hunters' attitudes as more positive than those of general public. Similar results were produced by the present research. The hunters in the respondents' families can only encourage the students' interest to learn if their attitudes regarding learning about wolves were also favorable.

Previous research [21] pointed out that having a hunter in the family results in participants' lower fear of wolves. In the present research, this finding was not confirmed. The results indicate that seeing a wolf in nature raises more support for wolves. These findings coincide with favorable impact of direct experience on attitude formation [22]. However, further research should be undertaken to substantiate the statement that education is most effective when it is based on direct experience [2]. Future studies are also required to determine the effect of sheep breeding in the family, and seeing a live wolf in nature. The present research established no relationship between breeding sheep at home and the respondents' attitudes, which is contrary to the widespread general belief. Probably it may be due to the fact that the decision to breed sheep is made by the parents rather than by the adolescents themselves.

Attitudes and Knowledge after Treatment

The results indicate that the university workshop treatment was most effective, even if it was performed by the same teacher and the instructions were identical for the school setting. According to Williams and Williams [57], students' motivation can also be improved by the change of learning environment, see also [35,36]. The difference may also be explained by the fact that the university group consisted mainly of veterinary technician school students, who expressed the most positive attitudes

and the highest knowledge scores already before teaching. University workshop also significantly influenced the students' acceptance of wolves as their fear after the treatment was reduced, which is consistent with the model of Cognitive vulnerability [58]. The school lectures and teacher-centered treatment also influenced the students' attitudes regarding acceptance of wolves, but the effects were not as significant as the ones of the university workshop. It needs to be pointed out that only school lecture treatment influenced the students' attitudes regarding wolf conservation and changed them into slightly more positive. Students from this group expressed the most favorable attitudes regarding conservation already in the pre-test. The result may be the consequence of the ceiling effect [45]. Nevertheless, all the treatments influenced the students' knowledge. All of them demonstrated significantly more knowledge regarding wolves in the post-test. Surprisingly, none of the treatments influenced attitudes regarding interest to learn. No more willingness to learn about wolves was detected among respondents after the different type of treatment. If the observation of living wolves were included in the instructions (i.e., zoo visit), we could have expected a shift in interest to learn about the species, since the presence of living animals arouses emotions and consequently higher motivation [27,28]. The present research indicates that living in an area with constant wolf presence positively correlates with interest to learn and acceptance of wolves. In addition, the relationship between seeing a wolf in nature and less fear and consequently more acceptance was noted. Both findings regarding wolf presence are contrary to the general beliefs i.e., [14,15,23–25,52,59]. Findings of the present study can serve as the orientation for educational programs' planning. In order to make students more willing to learn, direct experience of wolves and their natural habitats should be considered.

5. Conclusions

The findings of the present research showed that knowledge regarding wolves was higher after the treatment. As predicted, the highest achievement was observed among the University groups (aligning with Hypothesis 1) due to the novel learning environment or students' educational background. Contrary to our expectations, the students' attitudes were not more positive in all dimensions after treatment. This finding can be explained by different instruction design (treatment). Instructions in the future should encompass direct experiences of wolves to arouse the students' interest to learn. The highest attitude change after the treatment was recorded for the University workshop, as predicted in Hypothesis 2. The results indicate that knowledge and the study program are the strongest influencing factors regarding attitudes (aligning with Hypothesis 3). Other factors, i.e., gender, having a hunter in the family, breeding livestock, and direct experiences with wolf in nature, have no such strong effect on students' attitudes. Gender and having a hunter in the family generate more interest to learn. Observing a wolf in nature was linked with less fear and consequently better acceptance of the species. Breeding livestock was the only factor with no effect on the students' attitudes, but it must be noted that these results are based only on part of the sample. In future research, a larger sample to explore the effect of this factor is needed. As predicted (Hypothesis 4), the study program produced the highest differences regarding the knowledge of wolves. The students from veterinary technician study program were more knowledgeable than their counterparts from the general upper secondary school program. However, it is not certain whether this is a result of learning in different schools or that of students' knowledge and their interests for enrolment in vocational or general schools.

The present study highlights the importance of the students' knowledge and their educational background in regards to wolf conservation issues. In contrast to the general belief, the study results indicate that female students were more willing to learn about wolves. Other factors that should also be considered in educational programs include hunters' influence on students' motivation to learn and observing wolves to mitigate the students' fear. The authors urge that future research also focuses on students' attitudes regarding livestock breeding family background. Finally, the present study foregrounds the effectiveness of the student-centered instruction regarding wolf conservation issues and should be considered when planning teaching interventions in species conservation and

management actions. Also, when educating the general public we consider these practical methods as more appropriate than simple lectures.

Author Contributions: Conceptualization, all authors; methodology, all authors; software, C.R. and I.T.; validation, C.R. and I.T.; formal analysis, C.R., I.T., and V.O.; investigation, D.N. and V.O.; resources, C.R. and I.T.; data curation, V.O.; I.T.; writing—original draft preparation, V.O. and I.T.; writing—review and editing, all authors; visualization, I.T.; supervision, C.R. and I.T.

Funding: This research received no formal external funding. Christoph Randler is supported by the Gips-Schüle Stiftung. The funder had no influence on the research and the decision to publish. We also acknowledge the support by Deutsche Forschungsgemeinschaft and Open Access Publishing Fund of University of Tübingen.

Acknowledgments: The authors wish to thank Tina Levec for correcting the English and students for their participation in the research.

Conflicts of Interest: The authors declare no conflict of interest.

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2.3 ZNANJE IN STALIŠČA UČENCEV IN DIJAKOV DO RJAVEGA MEDVEDA (*Ursus arctos* L.): ALI LAHKO VEČ ZNANJA ZMANJŠA STRAH IN PRIPOMORE K PRIZADEVANJEM ZA OHRANJANJE?

Znanstveno delo 3:

Oražem V., Smolej T., Tomažič I. 2021. Students' attitudes to and knowledge of brown bears (*Ursus arctos* L.): can more knowledge reduce fear and assist in conservation efforts? Animals, 11: 1–18

Širjenje velikih zveri po Evropi predstavlja izziv za njihovo ohranjanje. Ker je uspešnost ohranjanja lahko v veliki meri odvisna od človekovega vedenja, je poznavanje nastanka določenih vedenj in vseh dejavnikov, ki nanje vplivajo, ključnega pomena. Ta študija je vključevala 534 učencev in dijakov, ki so bili razdeljeni v kontrolno skupino (n = 317) in eksperimentalno skupino (n = 217). Vzorec je sestavljalo 309 učencev višjih razredov osnovne šole (OŠ, n = 309, Mstarost = 12,2, SD = 0,94) in 225 dijakov (SŠ, n = 225, Mstarost = 16,5, SD = 0,99). Ocenili smo njihova stališča do rjavih medvedov in znanje o njih. Opisan je tudi posredni učinek delavnic (pouka). Socialnodemografski dejavniki, kot sta spol in srečanje medveda v naravi, so pomembno vplivali na stališča in znanje učencev ter dijakov. Območje bivanja, lastništvo psa, prisotnost lovca in reje pašnih živali v družini ter obiskovanje živalskega vrta so imeli manjši vpliv na stališča in znanje učencev in dijakov. Rezultati kažejo, da je večja količina znanja povezana s stališči, ki podpirajo varstvo vrste, in deloma z zmanjšanjem količine strahu. Priporočljivo je, da prihodnje aktivnosti ohranjanja in upravljanja vključujejo tudi učinkovito komunikacijo, zlasti izobraževalne dejavnosti, ki temeljijo na neposrednih izkušnjah in skrbno oblikovanih informacijah o vrstah in družbenoznanstvenih vprašanjih.

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Students' Attitudes to and Knowledge of Brown Bears (*Ursus arctos* L.): Can More Knowledge Reduce Fear and Assist in Conservation Efforts?

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Simple Summary: Large carnivores distributed throughout Europe have interactions with people because their habitats often collide with human settlements. Since human behavior can significantly influence the conservation of these species, knowledge of certain behaviors and factors of influence are crucial. The present study included 534 students from lower and upper secondary schools. In this article, students' attitudes to and knowledge of brown bears and the indirect effect of teaching are examined. Factors such as gender and seeing a bear in nature were found to influence the students' attitudes and knowledge significantly, implying that they should be considered in any future educational actions. Other factors like residence, owning a dog, having a hunter in the family, breeding livestock and visiting a zoo had a smaller effect on the students' attitudes and knowledge in general. The results thus indicate that greater knowledge was correlated with proconservation attitudes and reduced fear among the students.

Abstract: The expansion of large carnivores across Europe is posing a challenge to their conservation. Since success with conservation may depend significantly on human behavior, knowledge of certain behaviors' emergence and all the factors that affect them are crucial. The present study included 534 students who were divided into a comparison group (n = 317) and a treatment group (n = 217) consisting of 309 lower secondary (LS, M_{Age} = 12.2, SD = 0.94) and 225 upper secondary (US, n = 225, M_{Age} = 16.5, SD = 0.99) school students. We assessed their attitudes to and knowledge of brown bears. An indirect effect of the workshops (instructions) is also described. Sociodemographic factors, such as gender and seeing a bear in nature, significantly influenced the students' attitudes and knowledge. Residence, owning a dog, having a hunter in the family, breeding livestock and visiting a zoo had a smaller effect on the students' attitudes and knowledge. The results thus show that greater knowledge is correlated with proconservation attitudes, and partly with reduction of fear. Therefore, future conservation and management should employ strong communication, especially education activities based on direct experiences and carefully designed information regarding species and socio-scientific issues.

Keywords: brown bear (*Ursus arctos*); attitudes; knowledge; workshops; conservation

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Citation: Oražem, V.; Smolej, T.; Tomažič, I. Students' Attitudes to and Knowledge of Brown Bears (*Ursus arctos* L.): Can More Knowledge Reduce Fear and Assist in Conservation Efforts? *Animals* **2021**, *11*, 1958. https://doi.org/10.3390/ani11071958

Academic Editor: Peter Murray

Received: 4 June 2021
Accepted: 28 June 2021
Published: 30 June 2021

1. Introduction

The expansion of large carnivore species across Europe [1] adds to the challenges entailed in conserving them [2]. Brown bears (*Ursus arctos* L.) in Slovenia belong to the northern part of the wider Dinaric-Pindos population, spreading spatially and in abundant numbers [3]. The latest genetic estimation of the size of the brown bear population in Slovenia was made in 2015. The minimum yearly estimate for that year was 599 (545–655) individuals [4]. The most recent population estimate was made in 2018 and based on mathematical modeling. For that year, the maximum yearly abundance was 975 (875–1130) bears [5]. Across Europe, large carnivores such as brown bears are spreading because of

increasing forest cover, crop coverage, shrinking human population density and forest fragmentation. These species have considerable adaptability, which means that large their coexistence with humans depends not simply on habitat suitability, which is already present, but rather on humans' acceptance and policies [6]. In the majority of Slovenia, bear habitats border on human settlements, making interactions with people inevitable. Even if the population is considered stable, human-bear conflicts are still the biggest threat to the successful long-term conservation of the species [3].

Since human behavior can significantly impact conservation success, knowledge of the emergence of certain behaviors, and all the factors that affect them, are crucial [7]. The conservation of carnivore species is subject to sociopolitical and biological factors [8]. Therefore, all conservation and management actions should also include understanding people's attitudes toward large carnivores [9]. In such actions, attitudes are often believed to change behaviors directly, yet the link is far more complex. In the theory of planned behavior [10] and the theory of reasoned action [11–13], the "behavioral intention" or intention to act is defined as a key precursor of the individual's behavior. Personal attitudes and "subjective norms" are determinants of these acting intentions. Attitudes generally have three main components: affective, cognitive and conative [14]. Knowledge has been stated as the "structural property of attitudes" [15]. Several studies, e.g., [16,17] linked more knowledge with greater consistency in attitudes and behavior. Some authors e.g., [18] pointed to the importance of the individual knowledge dimension for attitudes, not just the amount of knowledge itself. After a person has acquired sufficient knowledge and skills, adequate decisions regarding behavior can be made [19]. On the other hand, the importance of feelings and emotions should not be neglected. When predicting management options in the case of brown bears and wolves, feelings can play a more important role than cognitions and knowledge itself [20].

While exploring environmental attitudes, two main dimensions emerge: preservation and utilization [21,22]. This approach offers insight into a respondent's support for or opposition to conservation or management actions, providing a valuable orientation for future activities. However, if we wish to influence attitude formation in the long term, especially among children and adolescents, it is crucial to research the factors that influence attitudes, especially knowledge and teaching approaches.

Due to their importance for species conservation, attitudes to large carnivores have been researched extensively. However, most studies considered the general public or stakeholder groups, yet only a handful of such studies focused on children and students' attitudes, e.g., [23–32]. Some research into attitudes to brown bears, as well as knowledge of the species, has already been conducted in Slovenia [33–35], but none of it has concentrated on school students and the influence of teaching (e.g., workshops). In the present study, the authors aimed to fill the gap in a particular segment of the population because most of the studies considered the general public or stakeholder groups.

For that reason, lower secondary and upper secondary students' attitudes to, and knowledge of, brown bears were assessed. Along with these two measured variables, the indirect effect of the workshops (instructions) is also shown.

Building on the above background, the following research questions (RQ) were explored in our research:

RQ 1. Do socio-demographic factors like place of living (rural, suburban, urban area; bear area, bear occurrence area, non bear area), gender, owning a dog, having a hunter in the family, breeding livestock, having encountered a bear in nature or visiting a zoo influence students' attitudes to and knowledge of bears and bear topics?

RQ 2. Do students' attitudes to and knowledge of bears and bear topics vary by education level (comparing lower and upper secondary school programs)?

RQ 3. Does the amount of knowledge influence individuals' attitudes to this species?

RQ 4. Can the indirect influence of instructions (the workshops performed) be detected in the students' attitude and knowledge?

2. Materials and Methods

2.1. Sample

First, schools from different regions were contacted and were offered workshops that were organized within the LIFE DINALP BEAR project. In addition, schoolteachers were asked if they would be willing to participate in an additional study where students' attitudes and knowledge regarding bear topics would be assessed. Schools had the decision to participate in an additional study or not, which makes it very difficult to achieve higher sample sizes. Ten lower secondary schools and four upper secondary schools participated in the study. For those schools, we randomly assigned classrooms for treatment and control groups. Questionnaires were administered in one session either before or after the workshops took place and were administered by the two persons who were conducting workshops (see Study design). The initial sample consisted of 542 lower and upper secondary school students. Students who submitted incomplete questionnaires were excluded from the final sample ($n = 8$). The final sample, therefore, included 534 students, divided into a comparison ($n = 317$) and a treatment group ($n = 217$) consisting of 309 lower secondary (LS, $M_{Age} = 12.2$, SD = 0.94) and 225 upper secondary (US, $n = 225$, $M_{Age} = 16.5$, SD = 0.99) school students, of whom 45.9% were male ($n = 245$) and 53.0% female ($n = 283$). Six students did not report their gender (1.1%). The majority of the students lived in a rural area (54.3%). The remaining students lived in a suburban area (19.9%) or an urban area (25.8%). The research focus was on participants who live in areas of permanent bear presence, with 71.2% of the sample meeting this criterion. The other students lived in an area of either occasional bear presence (21.2%) or without the presence of bears (4.9%). Other factors, such as a hunter in the family, livestock breeding, owning a dog, visiting a zoo, or having encountered a bear in nature, were also recorded. Among the whole sample, just 20.8% of the students reported a family relationship with a hunter. Only 8.8% of students reported that their families breed livestock, and 62.4% that they owned a dog. Most students reported visiting a zoo less than once a year or never (64.6%). The other respondents visit a zoo more frequently (34.6%). Most students (63.7%) had also not seen a bear in nature before the research took place and were not included in a similar workshop (75.5%). The workshop and survey implementation took place in the 2016–2017 school year. Since the testing was done for educational purposes and participation was anonymous and voluntary, ethical approval was not needed in Slovenia. Before or during the survey (relevant for the comparison group) and intervention (relevant for the treatment group), no other lessons about large carnivores had been given to the students.

2.2. Teaching Materials Regarding Brown Bear (LIFE DINALP BEAR Project)

The teaching materials (teachers' manual, worksheets, and a PPT presentation for immediate use) [36] were designed as part of the LIFE DINALP BEAR project and are compatible with existing science and biology curricula. The materials are also structured according to difficulty (educational) levels. The LIFE DINALP BEAR project's main goal was to establish the transboundary conservation and management of brown bears, with species' population-level monitoring, management and conservation (across the northern Dinaric Mountains and south-eastern Alps area), to reduce human-bear conflicts, to promote coexistence as well as the species' natural expansion from the Dinaric Mountains into the Alps [37]. The workshops were conducted as teacher-centered presentations of bear systematics, ecology, genetics, and measures supporting human-bear coexistence, and as student-centered workshops where students worked with biological materials like a bear skull, footprints and fur. In the project, workshops were also organized for teachers to facilitate the long-term use of the prepared teaching materials in an in-school setting.

The effectiveness of designed workshops was measured indirectly. This approach was selected due to two-person research execution only, and other organizational constraints (i.e., regular classroom interruptions with our research).

2.3. *Study Design*

The study was divided into three parts and two subsamples (in both, the participation of lower and upper secondary school students was evenly distributed) (see Figure 1):

Study part 1. The students' (subsample 1: comparison group) attitudes to and knowledge of bears and topics related to the species (baseline study) were assessed using a Bears Attitude and Knowledge Questionnaire (BAK-Q). In this part, an ex ante evaluation of the students' attitudes and knowledge was performed. After the attitudes and knowledge assessment, some students participated in the workshops (received the treatment) but were not included in the post workshop survey.

Study part 2. Students' attitudes and knowledge were assessed in an ex post evaluation (subsample 2: treatment group). After the treatment, the students' attitudes and knowledge were measured using the same BAK-Q.

Study part 3. Comparing the two groups: attitudinal ratings and knowledge scores of the comparison group (baseline data) and the treatment group (treatment data). Comparison of both subsamples entailed nonequivalent datasets.

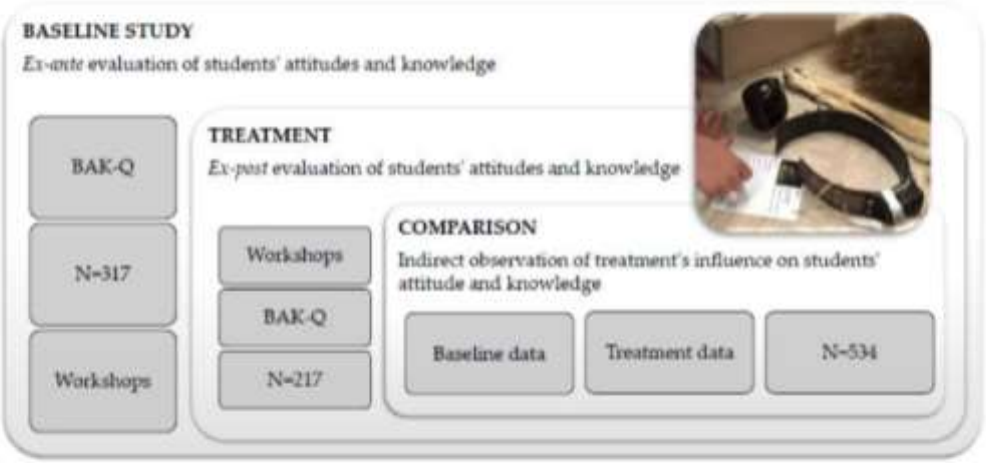

Figure 1. Study design.

To avoid the effect of the teacher as much as possible [38], the students were taught by two persons, one a prospective preservice biology teacher and the other an in-service biology teacher, both experienced in conducting similar workshops on large carnivores, (e.g., [28]) and in teaching in informal learning environments. The workshop consisted of teacher-centered instruction, a lecture on selected bear topics (bear systematics, ecology, genetics, coexistence with humans), and a student-centered workshop that encompassed three workstations at which various bear topics were presented. All workshops were incorporated into the regular science or biology classes.

2.4. *Measure*

A methodologically similar questionnaire, previously used for assessing attitudes and knowledge about wolves [27,28], was adopted to assess the students' attitudes to, and knowledge about, bears (Appendix A). In the first part of the Bears attitude and Knowledge Questionnaire (BAK-Q), the students' knowledge of bears was assessed based on true/false statements [26] related to bear biology, management, and conservation. To minimize the possibility of guessing, an "I Don't know" option was offered for each question. The second part of the questionnaire contained 15 attitudinal items (statements) covering different attitudinal dimensions: (1) willingness to learn about bears; (2) acceptance (fear)

of bears, and (3) views regarding the species' conservation (with reference to Slovenia). For attitudinal items, a 5-point Likert scale was used. Similar items were used in prior studies where authors assessed participants' attitudes to wolves (i.e., [27,28]) and/or other animal species or animal groups (i.e., [30–42]). The questionnaire's third part gathered the respondents' sociodemographic information.

2.5. Data Analysis

Principal component analysis (PCA) with an Oblimin rotation was used to explore whether selected attitudinal items fit within an individual attitudinal dimension (a principal component). For the final solution, only eigenvalues > 1 were considered. Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of the sampling adequacy test were calculated to assess PCA appropriateness on the present dataset. Besides a critical KMO value of >0.70 [43], a minimum loading of at least 0.40 was used [44].

Extracted PCs (from the second, attitudinal part of the questionnaire) and summed knowledge scores (from the first, knowledge part of the questionnaire) were used as dependent variables and further analyzed according to independent variables such as gender, lower or upper secondary school (education level), place of residence (rural, suburban, urban; within an area of constant, occasional, or no bear presence), owning a dog, having a hunter in the family, livestock breeding, and having encountered a bear in nature. In the following General Linear Model (GLM) analysis, gender, education level, and place of residence were treated as fixed factors, and knowledge as a covariate. Other variables (having a hunter in the family, breeding livestock, owning a dog, and visiting a zoo) were excluded from GLM analysis due to the small sample sizes, but were applied when analyzing the effect of individual independent variable on students' attitude and knowledge. The mean knowledge score was further used to categorize the students with regard to knowledge into low (mean score < M − 1SD), middle (mean score within M ± 1SD), and high student achievements (mean score > M + 1SD). The purpose of categorizing the knowledge scores was to compare the respondents' attitudinal scores with their achievement. All statistical analyses were conducted using SPSS 20.0 software (SPSS, IBM Germany, Ehningen).

3. Results

The results are presented in four parts. First, the results of PCA and GLM are shown. The second part presents the baseline results of analyses of the students' attitudes to and knowledge of bears (ex ante evaluation, using only the pretest), according to the selected independent variables. In the third part, ex post results of the students' attitudes to, and knowledge of bears after the treatment (using the post workshop sample only) with respect to the selected independent variables are presented. The fourth part of the results describes the indirect impact of the treatment (the workshops) on the students' knowledge.

3.1. Results of the Principal Component Analysis (PCA)

To explore whether the use of PCA was appropriate for the present dataset, the Kaiser-Meyer-Olkin (KMO) measure to test the sample's adequacy and Bartlett's test of sphericity were conducted. The results of both tests showed the PC structure was appropriate (see Table 1). Three meaningful PCs were extracted: (PC I) Conservation, (PC II) Interest to learn about bears, and (PC III) Fear: acceptance of bears.

3.2. Results of the General Linear Model (GLM): Multivariate Statistics

From Table 2 it can be seen that residence had no significant effect on the students' attitude ratings. No interactions were found between the independent variables. The results show that the amount of knowledge regarding bears determined the students' attitudes to this species the most. Other factors of significance were study level, gender, and direct experience of bears, while the place of residence did not affect the students' attitude ratings.

Table 1. Principal component analysis with an oblimin rotation of items to the individual attitudinal dimension.

Item	Component (PC)		
	I	II	III
Conservation			
Bears should be killed (exterminated). S_26_R *	0.743		
It would bother me if all the bears were culled in Slovenia. S_22	0.701		
In my opinion, there are too many bears in Slovenia. S_20_R *	0.677		
It is important to preserve brown bear species for future generations in Slovenia. S_10	0.662		
It is not necessary for the bears to be protected in Slovenia, as enough of them live elsewhere in Europe. S_06_R *	0.660		
Bears have the right to live and use forests, just like humans do. S_03	0.573		
Interest to learn			
I would like to learn about bears. S_09		−0.854	
I would also like to learn about species of bears that do not live in Slovenia. S_05		−0.809	
I want to know how bears feed, predate, and hibernate. S_21		−0.749	
I like to watch popular science shows about bears. S_01		−0.736	
I would like to learn about the damage caused by bears and conflicts with humans. S_15		−0.626	
Fear—acceptance			
I would be scared to walk in the woods if I knew bears were living there. S_23_R *			0.800
I am afraid of bears. S_04_R *			0.789
I would accept the presence of bears in the forests in my area without any problems. S_11			0.659
I would rather watch a movie about bears than see a living animal in the wild. S_27_R *			0.599
Kaiser-Meyer-Olkin (KMO)		0.826	
Bartlett's test of sphericity		$\chi 2 = 2108.834$ df = 105 $p < 0.001$	
Cronbach's alpha	0.77	0.82	0.70
Eigenvalues	3.894	2.326	1.757
Explained variance (%)	25.96	15.50	11.72

* Reversed items. Principal component loadings over 0.40 are presented. Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.

Table 2. GLM analysis of independent variables' effect on the students' attitude ratings.

Effect	Wilks' L	F	Hypothesis df	Error df	*p*	Partial Eta Squared
Intercept	0.360	297.517	3	501	<0.001	0.640
Knowledge	0.868	25.496	3	501	<0.001	0.132
Upper/lower secondary	0.968	5.584	3	501	0.001	0.032
Gender	0.928	12.953	3	501	<0.001	0.072
Place of residence	0.981	1.572	6	1002	0.152	0.009
Seen in nature	0.955	7.906	3	501	<0.001	0.045

3.3. *Baseline Results of the Students' Attitudes and Knowledge of Bears (Ex-Ante Evaluation)*

Lower secondary students (Figure 2a) expressed a slightly lower conservation attitude ($Z = -2.142$, $p = 0.032$), a somewhat greater interest to learn ($Z = -2.412$; $p = 0.016$), greater fear ($Z = -3.443$; $p = 0.001$), and significantly less knowledge ($Z = -4.820$; $p < 0.001$) of bears

than upper secondary school students. Males (Figure 2b) showed far less fear ($Z = -4.422$; $p < 0.001$) and more knowledge ($Z = -3.428$; $p = 0.001$) than females. Students who are dog owners (Figure 2c) possessed more knowledge about bears ($Z = -2.887$; $p = 0.004$), while students who lived in rural areas (Figure 2d) knew more about bears than their counterparts in suburban and urban areas ($\chi^2 = 17.101$; df = 2; $p < 0.001$). Students who reported having seen a bear in nature (Figure 2e) expressed less fear ($Z = -5.250$; $p < 0.001$) and more knowledge about the species ($Z = -3.343$; $p = 0.001$). Visiting a zoo had no effect on the students' attitudes or knowledge regarding bears (Figure 2f). Students whose family members or relatives are hunters (Figure 2g) expressed more knowledge about bears ($Z = -3.021$; $p = 0.003$), while those who come from livestock-breeding families (Figure 2h) also expressed slightly more knowledge ($Z = -2.494$; $p = 0.013$).

3.4. Ex Post Results of the Students' Attitudes to and Knowledge of Bears after the Treatment

Students from the lower secondary school (Figure 3a) expressed slightly higher conservation attitudes than their counterparts ($Z = -2.098$; $p = 0.036$). Females expressed higher proconservation attitudes ($Z = -3.096$; $p = 0.002$), showed somewhat greater interest to learn about bears ($Z = -2.210$; $p = 0.027$) and were slightly more afraid of them ($Z = -2.322$; $p = 0.020$) (Figure 3b). No gender-related differences were detected regarding what was known about bears. Dog owners (Figure 3c) expressed slightly more knowledge about bears ($Z = -2.069$; $p = 0.039$). No residence-related differences regarding attitudes and knowledge were identified (Figure 3d). Students who had already seen a bear in nature (Figure 3e) expressed slightly less fear ($Z = -2.146$; $p = 0.032$). Similarly, students who had visited a zoo more regularly (Figure 3f) reported less fear ($Z = -2.225$; $p = 0.026$). At the same time, they showed more interest to learn about bears ($Z = -3.055$; $p = 0.002$), yet they were not more knowledgeable about the topic. Having a hunter in the family had no influence on the students' attitudes and knowledge (Figure 3g). Livestock breeding (Figure 2h) led to slightly lower proconservation attitudes ($Z = -2.312$; $p = 0.021$).

3.5. Indirect Impact of the Treatment (Workshops) on the Students' Knowledge

The after-workshop (treatment) group expressed significantly more knowledge about bears than the pre-workshop (comparison) group ($Z = -5.019$; $p < 0.001$). However, no statistically significant differences regarding their attitudes were detected (Figure 4). When putting knowledge scores into three categories (low, middle, and high scores), a significant difference between the comparison and treatment group was detected ($\chi^2 = 26.235$, df = 2, $p < 0.001$). There were 8.3% of low achieving students in the treatment group compared to 17.7% of low achieving students in the comparison group. The same applied for the numbers of high achieving students, where there were 24.4% high achieving students in treatment group compared to only 9.8% of high achieving students in comparison group.

The two groups expressed very similar attitudes. However, students (from both groups) who revealed more knowledge about bears than their counterparts also expressed significantly higher proconservation attitudes, greater interest to learn about bears and less fear of them (Figure 5). In the comparison group (Figure 5a), statistically significant differences were found between the knowledge categories and all the attitudinal dimensions: conservation (Kruskal-Wallis: $\chi^2 = 26.096$; df = 2; $p = < 0.001$), interest to learn (Kruskal-Wallis: $\chi^2 = 10.698$; df = 2; $p = 0.005$) and fear-acceptance (Kruskal-Wallis: $\chi^2 = 40.283$; df = 2; $p < 0.001$). Similar results were established for the treatment group (Figure 4b). A statistically significant effect of knowledge influenced all three attitudinal dimensions, among which the biggest difference between knowledge categories was seen in the conservation dimension (Kruskal-Wallis: $\chi^2 = 14.800$; df = 2; $p = 0.001$), followed by an interest to learn (Kruskal-Wallis: $\chi^2 = 7.580$; df = 2; $p = 0.023$) and the fear-acceptance dimension (Kruskal-Wallis: $\chi^2 = 7.051$; df = 2; $p = 0.029$). While conservation attitudes and an interest to learn were similar in the two groups, some differences were determined between the treatment and comparison groups in the "Fear-acceptance" dimension. Namely, in the comparison group, less knowledge corresponded with greater fear. However, these

differences were partially eliminated within the treatment group (Figure 5b), where fear reduction among the students with the highest knowledge scores was less evident.

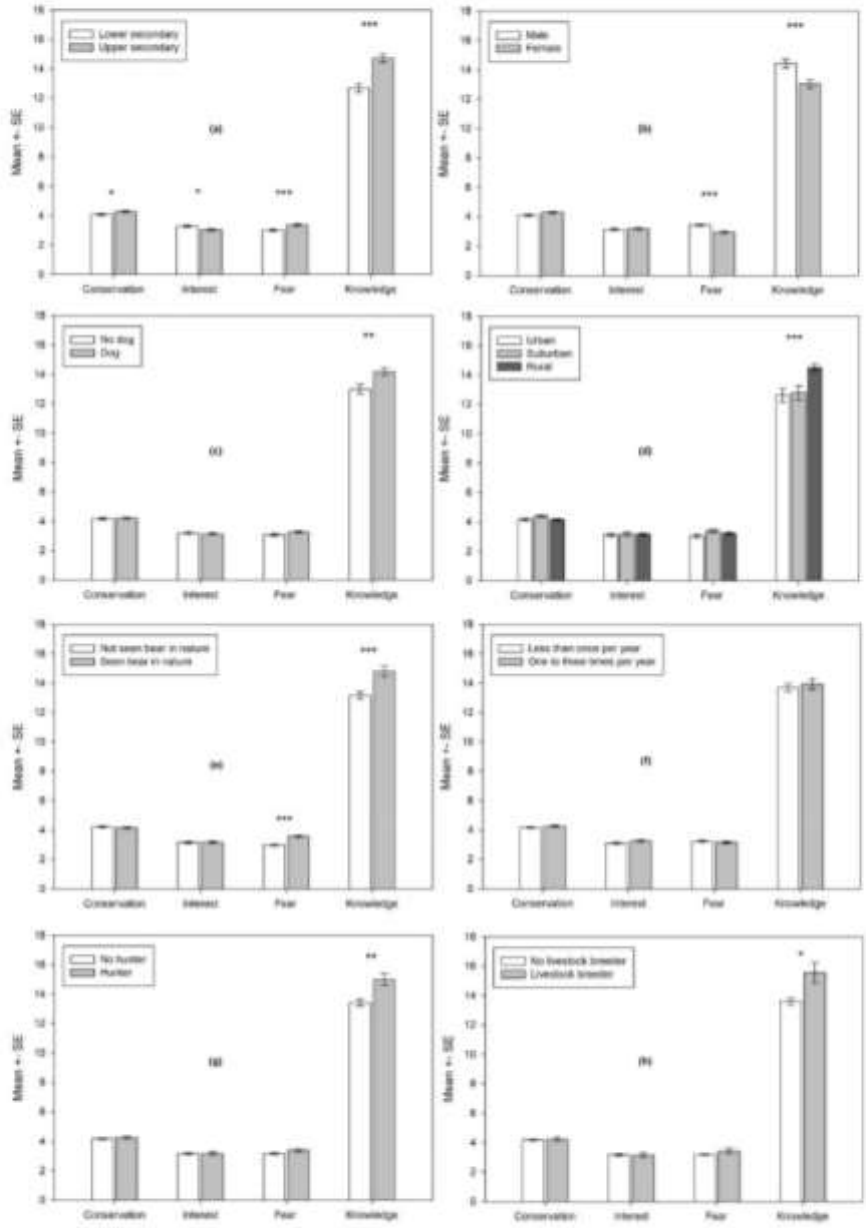

Figure 2. Differential effect of sociodemographic factors on the students' attitudes and knowledge at the pretest: (**a**) Education level (lower or upper secondary school); (**b**) gender; (**c**) owning a dog; (**d**) place of residence; (**e**) seen a bear in nature; (**f**) visiting a zoo; (**g**) hunter in the family; (**h**) breeding livestock. Note: lower mean values on fear dimension mean more fear (lower acceptance). Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

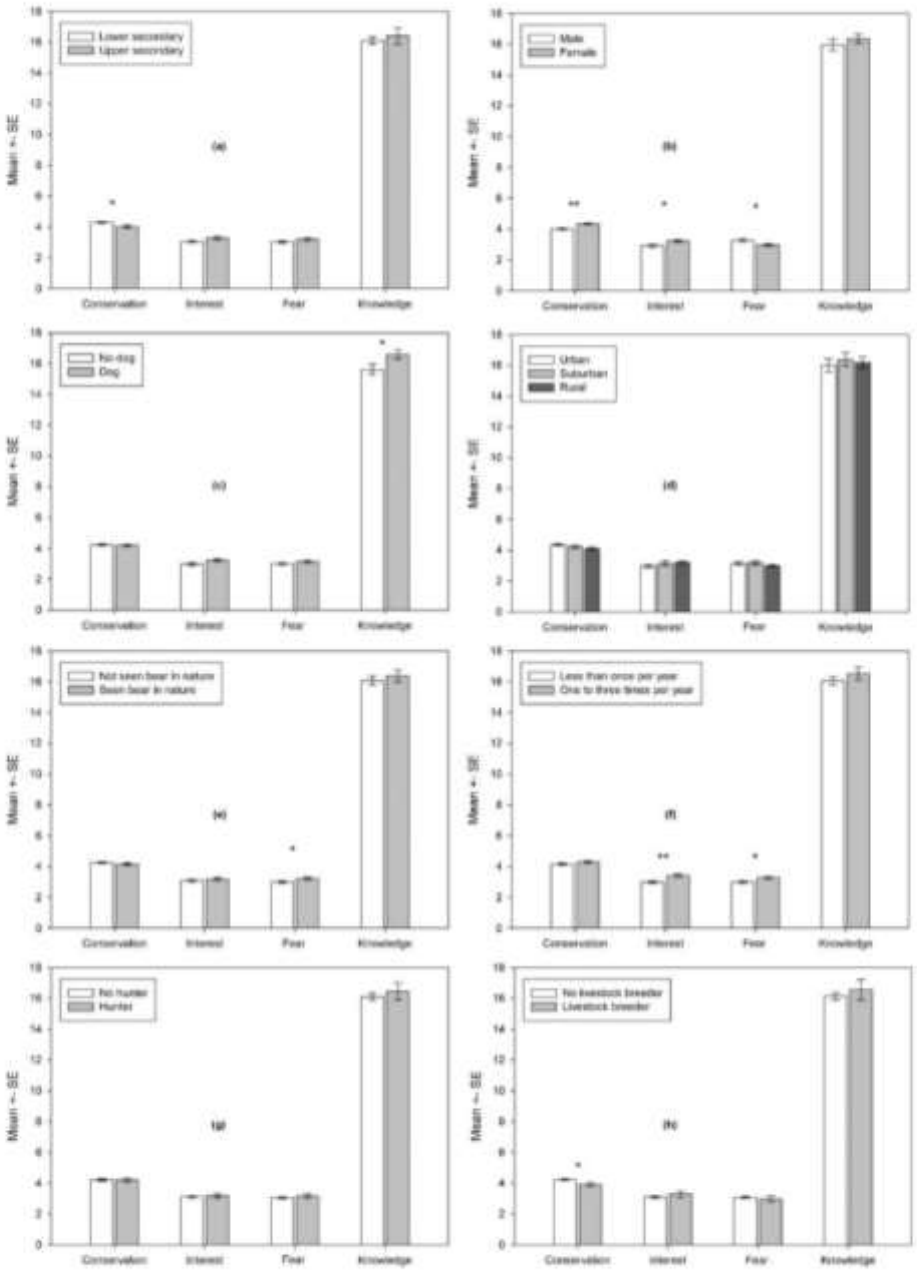

Figure 3. Differential effect of sociodemographic factors on the students' attitudes and knowledge at the post-test: (**a**) education level (lower or upper secondary school); (**b**) gender; (**c**) owning a dog; (**d**) place of residence; (**e**) seen a bear in nature; (**f**) visiting a zoo; (**g**) hunter in the family; (**h**) breeding livestock. Note: lower mean values on fear dimension means more fear (lower acceptance). Note: * $p < 0.05$, ** $p < 0.01$.

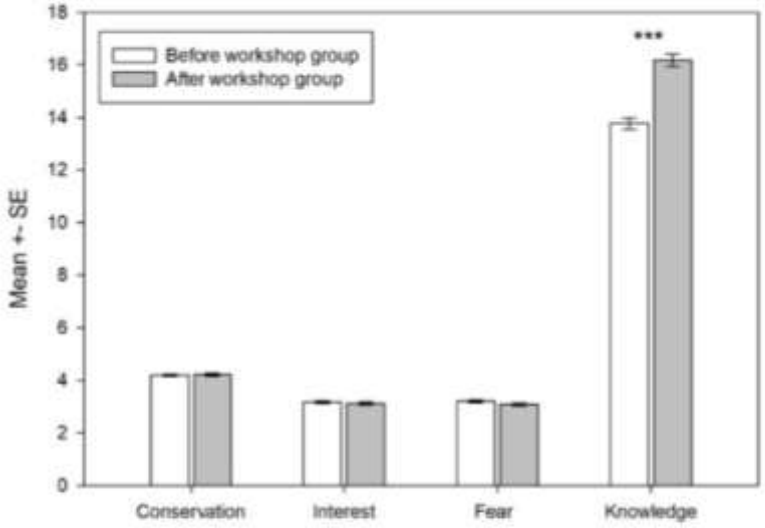

Figure 4. Effect of the instruction on the students' attitudes to and knowledge of bears. Note: lower mean values on fear dimension means more fear (lower acceptance). Note: *** $p < 0.001$.

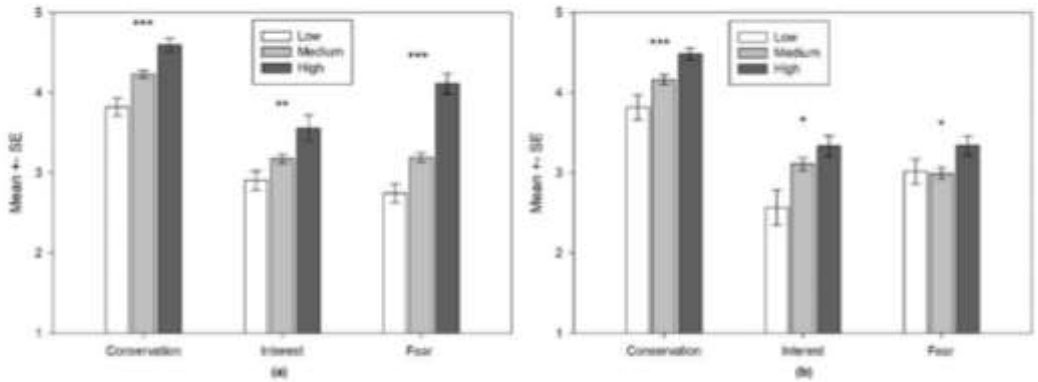

Figure 5. The effect of knowledge on different attitudinal dimensions: (**a**) the comparison group; (**b**) the treatment group; Note: lower mean values on fear dimension mean more fear (lower acceptance). Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

3.6. Correlations between Attitudinal Dimensions and Knowledge Scores

The correlations between attitudinal dimensions and attitudes regarding the knowledge scores were assessed for both the comparison (Table 3) and treatment groups (Table 4). In both groups, conservation attitudes were almost equally correlated with Interest to learn, Fear (acceptance) and Knowledge. In contrast to comparison group, a low correlation between the "Interest to learn" and "Fear-acceptance" dimensions was found for the treatment group. Students who expressed less fear of bears were more interested in learning about this species. In both samples, Interest to learn correlated with Knowledge, but higher correlation was found in a treatment group. Much higher correlation than in treatment group was found between Fear (acceptance) and Knowledge in comparison group.

Table 3. Correlations between attitudinal dimensions and knowledge scores of the comparison group.

			Interest to Learn	Fear-Acceptance ***	Knowledge
Spearman's rho	Conservation	Correlation coefficient	0.322 **	0.331 **	0.311 **
		Sig. (2-tailed)	<0.001	<0.001	<0.001
		n	317	317	317
	Interest to learn	Correlation coefficient		0.098	0.139 *
		Sig. (2-tailed)		0.081	0.013
		n		317	317
	Fear-acceptance	Correlation coefficient			0.398 **
		Sig. (2-tailed)			<0.001
		n			317

*** Correlations between fear-acceptance and other dimensions are positive due to reversed items. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Table 4. Correlations between attitudinal dimensions and knowledge scores of the treatment group.

			Interest to Learn	Fear-Acceptance ***	Knowledge
Spearman's rho	Conservation	Correlation coefficient	0.289 **	0.323 **	0.316 **
		Sig. (2-tailed)	<0.001	<0.001	<0.001
		n	217	217	217
	Interest to learn	Correlation coefficient		0.136 *	0.233 **
		Sig. (2-tailed)		0.045	0.001
		n		217	217
	Fear-acceptance ***	Correlation coefficient			0.202 **
		Sig. (2-tailed)			<0.001
		n			217

*** Correlations between fear-acceptance and other dimensions are positive due to reversed items. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

4. Discussion

This study indicates that gender is an important influencing factor concerning students' attitudes to bears and bear topics. The findings are consistent with most previous research [30,45–47] and highlight the lower fear of bears (general influence on attitudes and detected as a differential result in the two subsamples) and more knowledge on bear topics (subsample 1) among male students compared to the female students and their higher pro-conservation attitudes and slightly greater interest to learn about this species (subsample 2). The greater fear among the females can be explained by perceived vulnerability [48]. These findings regarding willingness to learn about bears are in line with earlier research [49]. Still, the results are inconsistent with previous research results, except for girls' somewhat greater interest to learn, compared to a study about wolves among Slovenian students [28]. This difference should, therefore, be considered in further research and while preparing educational activities.

The study showed no significant connection between place of residence and students' attitudes to bears in general, in contrast to other studies among primary and secondary school children [23,32,50]. In subsample 2, the differential results revealed no differences in knowledge with respect to place of residence. Since every student in the subsample was given the same instruction, and therefore scored equally in the post-test, the findings were expected. Interestingly, the varying results (subsample 1) for the impact of living areas on students' knowledge highlight the fact that rural students know more about bears than their counterparts in suburban and urban areas. Since such differences in knowledge in relation to place of residence were eliminated in subsample 2, the pre and post effect of workshops on the same students' knowledge should be further explored.

Having seen a bear in nature also proved to be a key attitude-influencing factor in general, especially for reducing fear (both subsamples), and is consistent with previous

research on wolves [28]. The research results also indicate that seeing a bear in nature was correlated with more knowledge of the species (subsample 1). Still, the connection was again not detected in subsample 2, presumably for similar reasons as mentioned above. More research is needed to understand this correlation better. Since the present findings show that seeing a bear in nature reduced fear, it is recommended that future research more systematically investigate how educational activities associated with observing bears in nature or outdoor learning about their habitats correlate with higher proconservation attitudes and behavior in nature in the long run. Some research already underscores the importance of direct experience for students forming a positive attitude [51] and the positive effect of exposure on bear habitat or bear presence in association with fear reduction [49] and greater support for conservation of the species [35].

Education level and enrolment in lower or upper secondary school influenced students' attitudes to and knowledge of bears. The lower secondary school students in subsample 1 knew significantly less than their counterparts from upper secondary school and their attitudes were slightly less positive, but they showed a little more interest to learn about bear topics. In contrast, the students in subsample 2 enrolled in upper secondary school showed slightly lower proconservation attitudes than the younger counterparts in the lower secondary school program. Previous research among primary and secondary school children also revealed age-dependent attitudinal and knowledge scores [50].

Other factors, such as visiting a zoo, owning a dog, having a hunter in the family, and breeding livestock, had less impact on students' attitudes and knowledge and need to be explored further. Students who regularly visit a zoo showed a somewhat greater interest to learn about bears, yet at the same time were a little more afraid of them. Since the effect was noticed only in this subsample, this aspect should be further investigated. Some previous studies e.g., [52] pointed to the importance of observing animals in a zoo setting, which can positively affect one's attitudes. Still, irrespective of whether the observation of living animals occurs in a zoo setting or in nature, it arouses emotions and positively affects learning motivation [53,54]. Students in subsample 1 who reported having a hunter in the family were more knowledgeable than their counterparts. Since the sample was relatively small, more research to confirm this link is needed. Students from livestock breeding families also expressed slightly more knowledge of bears (subsample 1), although their attitudes were slightly less positive (subsample 2). Since the sample of livestock breeders was also small, further research is also needed to study this link. However, some connections with previous research on the local general public and stakeholder attitudes to bears revealed that most of the effort in communication and education should go towards younger livestock breeders [35]. The results also highlight the importance of owning a dog. Students in subsample 2 who were dog owners knew slightly more about bears than their counterparts. Since the effect was noticed only in subsample 2, the link between these two variables should be further explored. The research on the local general public established a link between dog-owning and greater tolerance with regard to human-bear conflicts with bears [35].

The study results also show that the educational treatment (the workshops on bear topics) contributed to significantly more knowledge of bears among the participating students. Thus, a significant finding of the research is that more knowledge about bears has an important effect on a higher interest to learn about bears, more proconservation attitudes, and partly reduced fear among students. A favorable effect of knowledge on students' attitudes to carnivores was also established in earlier research [27,28,52]. A link between more knowledge of the species and higher proconservation attitudes has also been reported for the general public [35]. Since some differences between groups were detected in this study, more detailed research is needed to fully understand the interaction between knowledge and fear, and consequently human acceptance, as proposed by other authors, e.g., [55].

Expressed more fear by high achieving students within the treatment group can be linked to the indirect assessment of teaching. Using this approach for attitudes and

knowledge assessment can be considered a limitation of this study. In future research, the influence of teaching should be directly observed with pre and post assessment of the same group of students, as was done for wolves [28]. On the other hand, the detected phenomenon within the treatment group, where students with the highest knowledge scores showed more fear than their counterparts, can be linked to the results of previous experimental research [20,56,57]. Knowledge was suggested as a strong moderator of cognitions on feelings for wolves, but not for brown bears [20]. Furthermore, previously mentioned research [56,57] showed that verbal information could either positively or negatively influence emotions in children. Since the brown bear species is fear-relevant, students with more newly gained knowledge of the species could become more aware of the possible dangers the species present. It has already been proposed [58] that education interventions should encompass information about the species and their habitats and the presentation of conflict avoidance strategies to lower the risk perceptions in humans. Other authors, e.g., [59,60], also reported that while such interventions correlate with greater knowledge and lower conflict avoidance behavior, these correlation with more positive attitudes were weak [59,61]. Therefore, future research regarding educational strategies that influence students' knowledge and attitudes of brown bears should strongly rely upon socioscientific issues, as already proposed for wolves [27] and include information about the species' benefits into the teaching activities [60]. In the future, it would be of importance to explore which knowledge dimension (especially procedural) students should develop, and which appropriate skills should be obtained that, when combined with positive attitudes, lead to proconservation behavior.

While predicting proconservation behavior, it is crucial to consider the psychological barriers that may prevent the development of proenvironmental behavior, even if one's knowledge is great and attitudes positive. One of these inhibitory factors is perceived risk (e.g., physical or financial) [62]. For people who perceive the risk of a possible attack on family members or themselves, the constant feeling of fear can escalate to become an environmental stressor [63], which may further interfere with other everyday tasks [64], like avoiding outdoor-based activities [65]. In the long run, this kind of stress reduces life quality [66] and even policy support [67–69]. Various interventions possibly associated with reducing fear of large carnivore species have already been noted, such as information and education, direct exposure to animals or their habitats, participatory and collaborative approaches, and financial support [55]. Nevertheless, educational interventions are the most effective when they encompass direct experience [55,70–73].

5. Conclusions

Several findings of the present study are highlighted. A few sociodemographic factors (according to RQ1) significantly influenced the attitudes and knowledge of the students, such as gender or having seen a bear in nature. These factors should be considered in future research and while planning educational and communication activities. Other factors, such as residence, owning a dog, having a hunter in the family, breeding livestock, and visiting a zoo, had a smaller effect on the students' attitudes and knowledge generally, meaning they should be explored further. The research also established differences between education levels (RQ 2), mainly regarding the students' knowledge scores. The findings confirmed the assumption made in RQ3 that knowledge influences students' attitudes to bears. A significant influence of knowledge on all attitude dimensions, i.e., interest to learn, conservation and fear, was shown. Further, the significant influence of instructions (workshops) was detected with respect to the students' knowledge scores, but not regarding a change in attitude (associated with RQ4). Although, the present study indirectly explored the influence of the teaching (the workshops), a similar study should be performed on equivalent samples to directly investigate the influence of such teaching (pre and post testing of the same students).

Nevertheless, the study results show that more knowledge is correlated with stronger pro-conservation attitudes and partly with less fear. Through such workshops, students

gain considerable knowledge about different species. Yet, it must be noted that, besides acquiring knowledge, a more effective attitudinal switch must be identified. Therefore, future conservation and management actions should employ education activities that include direct experiences with realia, or even observing live animals and their presence in their natural habitats. One possibility is observing live animals in the local zoos. Furthermore, teaching activities regarding large carnivore socioscientific issues should not be neglected, and scientific evaluation of the effectiveness of such actions should not be excluded.

Author Contributions: Conceptualization, all authors; methodology, V.O. and I.T.; software, I.T.; validation, I.T.; formal analysis, V.O. and I.T.; investigation, V.O. and T.S.; resources, I.T.; data curation, V.O. and T.S.; writing—original draft preparation, V.O. and I.T.; writing—review and editing, all authors.; visualization, V.O. and I.T.; supervision, I.T. All authors have read and agreed to the published version of the manuscript.

Funding: The workshops were performed as part of the LIFE DINALP BEAR project (LIFE13 NAT/SI/000550), but the present research received no external funding.

Institutional Review Board Statement: Since the testing was anonymous and the study was of educational nature, the ethical approval was not needed.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Acknowledgments: The authors thank Urška Marinko and Jasna Tarman for coordinating the work with the schools, and Franc Kljun, Marko Jonozovič, and ZOO Ljubljana for sharing their biological bear materials. The authors are also grateful to Tina Levec for the thorough proofreading and participating students in the research.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Questionnaire: Used in the present study

Dear students. We invite you to take part in an anonymous survey (research) to assess your attitudes and knowledge about bears. Your cooperation will help us to improve pedagogical work and will influence the development and improvement of our nature conservation activities.

	Knowledge statements	Response
1	Bears do not kill sheep and do not feed on them.	TRUE FALSE I DON'T KNOW
2	Brown bear is an endangered species in Slovenia.	TRUE FALSE I DON'T KNOW
3	The majority of brown bear's diet represent the food of animal origin, such as roe deer.	TRUE FALSE I DON'T KNOW
4	By analysing the DNA from faeces samples, the bear kinship and abundance within certain areas could be assessed.	TRUE FALSE I DON'T KNOW
5	Beehives can attract bears and therefore lead to damage events.	TRUE FALSE I DON'T KNOW
6	By analysing DNA samples from bites on sheep, an individual bear who attacked or killed the animal can be determined.	TRUE FALSE I DON'T KNOW
7	When searching for fruits, such as plums, apples, and cherries, bears can cause damage to the fruit trees.	TRUE FALSE I DON'T KNOW
8	Brown bear represents a threat to humans.	TRUE FALSE I DON'T KNOW
9	Bears never kill the livestock and do not feed on them.	TRUE FALSE I DON'T KNOW
10	To protect people, brown bears do not need to be shoot.	TRUE FALSE I DON'T KNOW
11	Even if they have a strong odor, silage bales do not attract bears.	TRUE FALSE I DON'T KNOW
12	Brown bears walk around 7 km per day.	TRUE FALSE I DON'T KNOW

	Knowledge statements	Response
13	Bears feed on corn at the cornfields.	TRUE FALSE I DON'T KNOW
14	The cull is not a suitable management approach for damage prevention on small livestock.	TRUE FALSE I DON'T KNOW
15	Waste in the bins outside the houses can attract bears.	TRUE FALSE I DON'T KNOW
16	In nature, brown bears predate the healthiest herbivores.	TRUE FALSE I DON'T KNOW
17	In Slovenia, the brown bear is an alien species.	TRUE FALSE I DON'T KNOW
18	Bears usually visit sites with unprotected waste just once.	TRUE FALSE I DON'T KNOW
19	Brown bear is a solitary animal.	TRUE FALSE I DON'T KNOW
20	Dogs, even if properly trained, cannot protect livestock from predation.	TRUE FALSE I DON'T KNOW
21	Humans can replace the ecological role of brown bears in nature.	TRUE FALSE I DON'T KNOW
22	An electric fence is an effective measure for deterring bears from beehives.	TRUE FALSE I DON'T KNOW
23	The majority of brown bear cubs die before reaching the age of 1 year.	TRUE FALSE I DON'T KNOW
24	On the small pasture, livestock can be protected from bear attacks by an electric fence.	TRUE FALSE I DON'T KNOW
25	Overpopulation of bears in Slovenia causes attacks on livestock.	TRUE FALSE I DON'T KNOW
26	Waste bins should be put in front of the houses in the morning, right before the collection. In that case, bears do not have time to access them.	TRUE FALSE I DON'T KNOW

The meaning of the scale: 1 - I completely disagree, **2** - I disagree, **3** - indefinite, **4** - I agree, **5** - I completely agree

	Attitude items	Value
S_01	I like watching popular science shows about bears.	1 2 3 4 5
S_03	Bears have the right to live and use forests, just like humans.	1 2 3 4 5
S_04_R	I am afraid of bears.	1 2 3 4 5
S_05	I would like to learn about bear species that do not live in Slovenia.	1 2 3 4 5
S_06_R	In Slovenia, it is not necessary for bears to be protected, as there are enough of them living elsewhere in Europe.	1 2 3 4 5
S_09	I would like to learn about bears.	1 2 3 4 5
S_10	It is important to preserve the brown bear species for future generations.	1 2 3 4 5
S_11	I would accept the presence of bears in the near woods without difficulty.	1 2 3 4 5
S_15	I would like to learn about the damage caused by bears and about conflicts with humans.	1 2 3 4 5
S_20_R	I think that there are too many bears living in Slovenia.	1 2 3 4 5
S_21	I would like to know how bears feed, hunt, and hibernate.	1 2 3 4 5
S_22	It would bother me if all the bears in Slovenia were killed.	1 2 3 4 5
S_23_R	I would be afraid of walking in the woods if I knew bears live there.	1 2 3 4 5
S_26_R	It would be best to exterminate (kill) all bears.	1 2 3 4 5
S_27_R	I would rather watch a movie about a bear than see a live animal in the wild.	1 2 3 4 5

For the purposes of statistical data analysis, please fill in all sections below.

Gender: male | female	**Age:** _____
Grade | | **Study year:** | 6 | 7 | 8 | 9 || 1 | 2 | 3	
I live in/at: [ ] the city | [ ] the suburbs | [ ] the countryside	
I visit nature: [ ] (Almost) everyday | [ ] Once a week | [ ] Once a month | [ ] Occasionally	
I visit ZOO: [ ] less than once per year | [ ] 1–3 times per year	
Place of residence: _____	
I have a hunter in my family	yes | no
In my family, we breed livestock.	yes | no
I have already encountered a bear in nature.	yes | no
I have/had a dog as a pet.	yes | no

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2.4 DEJAVNIKI, KI VPLIVAJO NA VARSTVENA PREPRIČANJA OBISKOVALCEV ŽIVALSKEGA VRTA IN NA NJIHOVO ZNANJE O VELIKIH ZVEREH LETA 2009 IN DUCAT LET KASNEJE

Znanstveno delo 4:

Oražem V., Majić Skrbinšek A., Šorgo A., Tomažič I. 2022. Factors affecting zoo visitors' conservation beliefs and knowledge of large carnivores in 2009 and a dozen years later, 14: 1–17

Poučevanje v formalnem učnem okolju se osredotoča predvsem na pridobivanje znanja, le malo na oblikovanje pozitivnega odnosa do okolja in organizmov. Znanje pa je mogoče pridobiti tudi v neformalnih učnih ustanovah, kot so živalski vrtovi. Pri izobraževanju splošne javnosti vloga neformalnih učnih okolij ne bi smela biti zanemarjena. V članku predmet raziskave predstavljajo dejavniki, ki vplivajo na stališča obiskovalcev živalskih vrtov v povezavi z varstvom rjavega medveda, volka in evrazijskega risa. Študija, ki je bila izvedena v Živalskem vrtu Ljubljana, temelji na podatkih, pridobljenih iz anket, opravljenih v letih 2009 (n = 613) in 2021 (n = 257). Količina znanja in stopnja izobrazbe sta vplivali tako na naklonjena kot tudi na nenaklonjena stališča do vseh treh vrst velikih zveri. Vpliv spola je bil manj konsistenten. Vplival je tako na naklonjena kot tudi na nenaklonjena stališča do ohranjanja risa, hkrati pa le na nenaklonjena stališča do ohranjanja rjavega medveda in volka. Kot najpomembnejši dejavnik vpliva na ohranitvena stališča posameznika se kaže znanje. Ob tem se poudarja pomen izobraževalnih in komunikacijskih dejavnosti pri upravljanju in ohranjanju velikih zveri. Raznolik vpliv spola kaže, da je nadalje smiselno oblikovati izobraževalne dejavnosti, specifične za posamezno vrsto velike zveri.

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Factors Affecting Zoo Visitors' Conservation Beliefs and Knowledge of Large Carnivores in 2009 and a Dozen Years Later

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Abstract: Teaching in a formal learning environment mainly focuses on gaining knowledge, and scarcely on the development of pro-environmental attitudes. Knowledge can also be gained in informal learning institutions, such as zoos, and their potential use in general public education should not be neglected. This paper explores factors influencing the conservation beliefs of zoo visitors about brown bears, grey wolves, and Eurasian lynx. The study undertaken in Zoo Ljubljana (Slovenia) consisted of surveys performed in 2009 (n = 613) and in 2021 (n = 257). The levels of knowledge and education influenced both supporting and opposing beliefs about the three large carnivore species. The gender factor was less uniform: both supporting and opposing beliefs about lynx were demonstrated, but only opposing beliefs about brown bear and wolf. The study indicates that knowledge has the most significant influence on conservation beliefs, thus highlighting the importance of educational and communication activities in management and conservation actions regarding large carnivore species. The varied gender influence suggests that species-specific educational activities should be encouraged.

Keywords: large carnivores; conservation beliefs; knowledge; zoo visitors

Citation: Oražem, V.; Majić Skrbinšek, A.; Šorgo, A.; Tomažič, I. Factors Affecting Zoo Visitors' Conservation Beliefs and Knowledge of Large Carnivores in 2009 and a Dozen Years Later. *Sustainability* **2022**, *14*, 890. https://doi.org/10.3390/su14020890

Academic Editor: Reuven Yosef

Received: 22 October 2021
Accepted: 10 January 2022
Published: 13 January 2022

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1. Introduction

Three legally protected species of large carnivores—brown bear (*Ursus arctos* L.), grey wolf (*Canis lupus* L.) and Eurasian lynx (*Lynx lynx* L.)—are broadly present in Slovenia [1–3]. The presence of these species leads to potential and even real human–wildlife conflicts. So, there are natural and human factors by which the species are endangered. The need to find ways and solutions for their conservation has been recognized as a priority [4] (p. 1). There are three approaches to be introduced into large carnivore wildlife management: the cognitive approach (education), the technological approach (fences, deterrent devices, hunting) and the structural approach (legislation) [5]. The cognitive approach is the only way to change human attitudes as predictors of potential or actual behavior toward wildlife conservation. Education is a lifelong process that is not confined to a formal educational system: many formal and informal institutions also contribute. Education is one of the most important factors for the formation of pro-environmental attitudes [6]. In conservation biology, it is recognized as an important part of the field [7]. Schools and informal learning environments such as zoos or natural history museums are crucial to informing the general public about the conservation of species and ecosystems [8].

The conservation and management of animals requires a basis of public policies, research, and scientific values [9]: wildlife management efforts that do not include public

opinions are destined to be unsuccessful [10]. Frequently, management measures for large carnivores are poorly understood, and therefore unaccepted by the public, especially if the animals are recognized as a potential hazard to humans and domestic animals [11]. Individuals may formulate judgments about the acceptability of carnivore populations based on willingness to accept a hazard. Perception of hazard is largely a function of the perceived risks and perceived benefits associated with that hazard [11]. The subjective experience of an individual's fear is primarily linked to the perceived danger or harm that the animal represents and the perceived uncontrollability of the person's own response when encountering the animal [12,13].

Public attitudes and acceptance of animals, in particular carnivores, can strongly influence their conservation [14]: attitudes often change if animals are perceived to behave "problematically" [15]. Several articles investigating attitudes and knowledge in the general public in relation to large carnivores have been published [14,16–19] in the past decade. Perceptions of large carnivore species are based on species phylogeny in relation to humans, animal characteristics (such as aesthetic value), the perception of their intelligence, size, morphology, type of locomotion, potential dangerousness and damage to property, and even on cultural or historical background [20,21]. One of the findings was that large carnivores generate fear in humans mainly because of possible physical injuries [22].

Various factors may affect attitudes toward animals, among which are gender [23], culture, and even possession of pets [24,25]. Gender may be the most important factor, with females usually reporting greater fear than males [15,22]. This can be explained by the lesser physical ability of females to avoid attacks by predators [23]. On the other hand, such gender-based differences in attitude can also arise from religious beliefs [26]. Beside the mentioned factors, direct experience with animals was determined as a predictor of strength of positive attitude [10,27]—it was found that, generally, direct contact changes people's attitudes in a positive direction [28]. For example, males and females differ in positive attitudes toward different species. Males are known to like wild indigenous species (e.g., squirrel (*Sciurus* sp.), deer (Cervus *elaphus*), fox (*Vulpes vulpes*)) and exotic animals (e.g., dolphin (*Cetacea*), tiger (*Panthera tigris*), lion (*Panthera leo*)), while females like pets (e.g., cat (*Felis catus*), dog (*Canis lupus familiaris*), horse (*Equus ferus caballus*)) [29]. Preferences toward species are influenced by evolution, genetics, and psychosocial and cultural factors [30].

Because large carnivores are relatively rare, attitudes are not formed from first-hand experience, but are usually a result of secondary and selected information, if not prejudices and stereotypes [31]. To plan and execute the most effective measures for large carnivore conservation, knowledge of public opinion toward these animals is needed. Public opinion can be influenced by the general public's attitudes toward flagship (charismatic and popular) animal species and the experiences with them, and by the general acceptance of animals [15]. According to a previous study [9], knowledge of a species involves ecological and factual knowledge, or conservation awareness. For effective conservation and management actions, besides general public opinion, knowledge of species ecology and biology, as well as of socioeconomic and other factors, needs to be considered.

Before now, attitudes toward large carnivores have been analyzed among different groups, i.e., the general public [14,18,32–36], rural and urban residents [19,37], hunters [16,38], farmers and foresters [16], and students [16,31,39–43]. Recently, research has also arisen in a zoo setting [44–47]. However, more attention is usually paid to other (more charismatic) species, such as elephants [48], dolphins [49], gorillas and chimpanzees [50,51], reptiles and amphibians [52], and penguins [53,54].

Zoos, nature centers, museums and other similar institutions provide various educational programs classified as informal education. Since education is one of the main missions of modern zoos [55], they should not be regarded only as entertainment parks, research institutions, or ex situ keepers of rare species, but as educational institutions as

well. Conservation goals in zoos are usually included in leisure activities, educational programs, and animal protection and research [56,57]. When comparing zoo education to formal education, the former promotes the education of the general public regardless of personal status and age, and fosters conservation awareness as part of lifelong education [55]. Formal education, on the other hand, is oriented mainly towards the younger population. Zoos are believed to have a positive impact on attitude development [58]. Visitors of zoos express more humanistic attitudes toward animal species than individuals who do not visit zoos [6]. A more humanistic attitude refers to the formation of an emotional bond between humans and animals, although the connection between experiences of animals in a zoo and the attitudes that favor conservation is not as simple as it seems [45]. For example, viewing an animal in a zoo does not necessarily equate to pro-conservation action [59]. When people see animals at the zoo, different feelings and cognitions arise. Thus, it is important to find out whether these feelings and cognitions are linked with animal conservation [45].

Worldwide, around 700 million people visit zoos annually [60], providing an ample basis for conservation education [61]. People of different backgrounds, ages, education levels, and other characteristics can be invited into surveys try to assess their pro-environmental knowledge, attitudes and actions [62]. However, not all people visit zoos primarily to learn [63]: recreation may be the main goal, even if they think education is important [64]. Nevertheless, education in zoos is intended to inform visitors about ecological concepts and animal–habitat relationships [65], so as to raise environmental awareness [66]. Support for the conservation of animal species and wildlife increases with exposure to experts providing well-structured information about, along with experiences of, wildlife [67].

Each year, more than 250,000 people visit the largest zoo in Slovenia, Ljubljana Zoo [62]. Beside regular self-guided visits by the public, a number of activities and events are offered, for example, guided tours, zoo adventures (hands-on activities), petting zoos, zookeeper-for-a-day actives, camping at the zoo, photo safaris and birthday parties. Furthermore, the zoo organizes guided tours and activities for schools and other educational institutions. Each year, more than 10% of visitors, ranging from kindergarten children to university students, are enrolled in guided activities, as part of organized out-of-school activities [62]. At the time of the study, the zoo housed around 120 species of vertebrates, among them the three large carnivore species brown bear, grey wolf and Eurasian lynx. At every animal enclosure, information boards present biological and conservation-related information about the species [62]. Since Ljubljana Zoo is rather small, it is anticipated that visitors will stop by the enclosures with large carnivore species [68].

This paper explores how different factors influence the attitudes of zoo visitors toward brown bear, grey wolf, and Eurasian lynx, and their acceptance thereof. The results of the study will be used in the preparation of more effective educational efforts at Ljubljana Zoo concerning large carnivore conservation. Hopefully, the study will also be informative for a broader audience, especially in the field of large carnivore management and conservation.

The Purpose of the Study

The present study used a questionnaire modified from previous research [19] to analyze the supporting and opposing beliefs of zoo visitors regarding the three large carnivore species (brown bear, grey wolf and Eurasian lynx). The authors of previous research analyzed the differences in conservation beliefs related to large carnivores between rural and urban residents. They found small differences between the two groups in arguments supporting conservation. On the other hand, the analysis of arguments that oppose the conservation of large carnivores showed greater differences between the two groups. Differences in opinions opposing conservation were also found in relation to different species of large carnivores (brown bear, wolverine, grey wolf and Eurasian lynx). In general, low levels of support for direct use values (e.g., ecotourism and hunting) were found.

Additionally, we used multiple choice questions to assess visitors' knowledge about large carnivores. Via the modification and supplementation of arguments, the present study sought to find out:

- whether participants' opposing or supporting beliefs differ for individual large carnivore species;
- whether age, gender, education level, yearly number of zoo visits, place of residence, knowledge and beliefs before and after the visit, and the year of study affect the opposing/supporting beliefs of zoo visitors in relation to a selection of carnivore species;
- whether this varies between species;
- whether there are correlations between visitors' opposing/supporting beliefs and their knowledge.

2. Materials and Methods

2.1. Study Design and Participant Information

The present study investigates differences in zoo visitors' knowledge and conservation beliefs about large carnivores. It was performed as a repeated cross-sectional study [69]. Data were collected during four consecutive weekends in April and May 2009. The interviews were conducted near the entrance to the zoo. To assess the differences in knowledge and beliefs, participants were invited either when entering or exiting the zoo. Daily alternations between interviewing outgoing and incoming visitors were performed to homogenize the study sample. A total of 640 zoo visitors participated in the first part of the study. From this sample, 17 surveys were excluded as incomplete. In addition, 10 surveys were excluded as participants were not residents of Slovenia. The final size of the sample included in the statistical analysis was 613. The second run was performed twelve years later, in June 2021. Due to COVID-19 restrictions, the survey could only be performed during one weekend. The second sample consisted of 257 participants. Altogether, 870 respondents were included in the present study (Table 1).

Table 1. Sample structure by independent variables (gender, education level, frequency of visits and delivery of the questionnaire).

Variable	*N*	*N* (%)
Gender		
male	341	39.2
female	526	60.5
not specified	3	0.3
Education level		
primary school	59	6.8
high school	377	43.3
university	430	49.4
missing	4	0.5
Frequency of visits		
every two months	161	18.5
twice a year	190	21.8
once per year	452	28.2
less than once per year	265	30.5
missing	9	1.0
Questionnaire delivery—visit		
before the visit	303	34.8
after the visit	567	65.2
Questionnaire delivery—year		
2009	613	70.5
2021	257	29.5

Note: *N* = 870.

2.2. Questionnaire

The questionnaire consisted of three parts (Appendix A). The first part included questions about the respondent's socio-demographics: age, gender, education level, and the yearly number of zoo visits. The second part of the questionnaire consisted of seven multiple choice questions about large carnivores. Two general questions were about the protection of large carnivores ("*All large carnivores are protected by law—Yes/No/Not sure*") and compensations for damages inflicted by animals ("*Damages that are caused by large carnivores are covered by the state—Yes/No/Not sure*"). Two questions asked participants about the lynx: "*Lynx live in (a) pairs, (b) solitary, (c) groups, (d) not sure*" and "*Lynx became extinct in the near past but was reintroduced—Yes/No/Not sure*". One question was about bears: "*Bears eat mainly (a) food of animal origin, (b) food of plant origin, (c) equal amounts of food that is of plant and animal origin, d) not sure*". Two questions were about wolves: "*How much does an adult wolf male weight? (a) 10–20 kg, (b) 21–40 kg, (c) 41–60 kg, (d) more than 60 kg, (e) not sure*", and "*How big are wolf packs in Slovenia? (a) 1–10, (b) 11–20, (d) more than 30 individuals, (e) not sure*". Only one option was correct and was graded as one point for every question. For statistical analysis, we used summed scores. The "*not sure*" option was introduced for each question to minimize participants' guessing. The third part of the questionnaire was constructed after a previous study [19], wherein the authors used statements linked with supporting and opposing conservation beliefs for four large carnivore species found in Sweden. The respondents in their study were asked to only state whether the arguments were valid or not, and not to state the strength of the arguments. The 12 statements used in this study were based on a 5-point Likert-type scale (1—strongly disagree, to 5—strongly agree). Consequently, data analysis was also different. All respondents were asked to report their supporting and opposing conservation beliefs in relation to all three large carnivore species.

The attitudinal items consisted of positive (e.g., "*As a society, we have a shared responsibility to protect these animals.*") and negative statements (e.g., "*These animals could have a serious negative impact on the livestock breeding.*"). Negative wording was used to reduce response bias (e.g., "*There is no need for conservation in Slovenia because there are populations in other countries.*"). However, some authors have argued that second source variances can influence the unidimensionality of the test: they stress the importance of well-structured wording given the different linguistic skills of the respondents, e.g., [70]. The questionnaire consisted of unambiguous, concise sentences, which several experts had previously checked. These attitudinal items are comparable to those in other questionnaires used in similar surveys [31,42,43].

2.3. Data Analysis

First, a panel of experts from the zoo and the university reviewed the content of the questionnaire. Data analysis was undertaken using SPSS 25.0 software (SPSS, IBM, Germany, Ehningen). For each species, the participant belief ratings were first subjected to principal component analysis (PCA) with Direct Oblimin rotation (Table 2). According to Oblimin rotation, The Kaiser–Meyer–Olkin (KMO) measures of sampling adequacy (KMObear = 0.84, KMOwolf = 0.85 and KMOlynx = 0.84) and the Bartlett's values for sphericity (bear: $\chi^2 = 1866.8$, $df = 66$, $p < 0.001$; wolf: $\chi^2 = 1934.6$, $df = 66$, $p < 0.001$; lynx: $\chi^2 = 1929.7$, $df = 66$, $p < 0.001$) suggest that the analysis was appropriate for these data sets [71]. An eigenvalue above 1.0 and loadings of at least 0.40 were used for a final solution. In order to test the reliability of the extracted PCs, Cronbach's α coefficients were calculated; the values were all above 0.7, showing that the internal consistency of the components is reliable [71].

The results of the analysis are presented in Table 2. Eleven out of twelve statements were categorized in a similar way for every animal species, with seven of them opposing conservation (PC 1) and four supporting conservation (PC 2). The item "*It is hard to predict the effects of their extermination.*" did not load to any of the principal components, and was

therefore eliminated from further analysis. The two components explained 42.3% of the total variance for bears, 42.7% for wolves, and 42.8% for lynx.

For each extracted principal component, means and standard deviations were calculated (see Table 2), on which a series of GLM univariate and multivariate tests were applied. The effects of the independent variables of individual species on the ratings of supporting and opposing beliefs were assessed with univariate tests. Multivariate tests were conducted to find the effects of independent variables on supporting and opposing beliefs jointly for all three species. Gender, education level, frequency of visits and survey delivery by year and pre/post-visit were treated as fixed factors, while age and knowledge were treated as covariates in the multi- and univariate statistics. Partial eta-squared was used as a measure of effect size, where 0.01 was considered small, 0.04 moderate, and 0.1 large [72].

For variables that produced a statistically significant effect on participants' belief ratings, as assessed through GLMs, descriptive (means and standard deviations) and inferential (Mann–Whitney and Kruskal–Wallis test) statistics were applied. Bonferroni-corrected post-hoc Mann–Whitney tests were used to determine differences, following the Kruskal–Wallis test.

For knowledge, the total score was used to calculate the partial correlations with beliefs. Partial correlations for gender, education level, frequency of visits and survey delivery (comparison between years and pre–post-visit) were extracted.

Table 2. Factor analyses of attitude statements for individual large carnivore species.

ITEM	Principal Component 1 (PC 1)			Principal Component 2 (PC 2)		
	Lynx	Wolf	Bear	Lynx	Wolf	Bear
These animals compete with hunters over game such as deer and roe deer. (R)	0.662	0.646	0.672			
These animals may have serious negative impact on deer and roe deer numbers. (R)	0.633	0.630	0.617			
They may have serious negative impact on livestock farming. (R)	0.677	0.634	0.647			
Costs of compensation, research and monitoring are too high. (R)	0.658	0.666	0.641			
There is a high risk of human injuries. (R)	0.578	0.540	0.584			
We may use these animals as a valuable game species. (R)	0.589	0.598	0.548			
There is no need for conservation in Slovenia because there are populations in other countries. (R)	0.511	0.501	0.470			
We need to preserve these animals for future generations.				0.762	0.783	0.759
We should share the responsibility for conserving these animals.				0.663	0.688	0.674
I want them to exist in Slovenia, even though I may never see any of them in the wild.				0.690	0.699	0.705
These animals can have positive impact on balance of organisms.				0.700	0.722	0.699
Cronbach alpha	0.748	0.734	0.736	0.726	0.749	0.733
Eigenvalues	3.51	3.50	3.46	1.63	1.63	1.62
Explained variance	29.21	29.16	28.81	13.54	13.54	13.53
M	3.68	3.56	3.55	4.43	4.41	4.41
SD	0.776	0.768	0.751	0.627	0.642	0.640
It is hard to predict the effects of extermination (*did not fit in any principal component*).	/	/	/	/	/	/

Note: (R)—reversed items.

3. Results

The first part presents the results of multivariate and univariate tests. In the second part, the following correlations are given: (a) supporting beliefs between individual species, (b) opposing beliefs between individual species, (c) between supporting and opposing beliefs for individual species, (d) between supporting beliefs and knowledge for each

species, and (e) between opposing beliefs and knowledge for each species. The third part of the results shows participant ratings according to the individual independent variable that produced the highest effects in the multivariate and univariate statistics.

3.1. The Results of Multivariate Statistics

In Table 3, the results of multivariate statistical analysis of supporting beliefs for all three species are presented. The main factors affecting beliefs are knowledge and gender, whereby the size of the effects is measured by partial eta-squared. It shows that knowledge has a moderate effect, while gender has a small effect on participants' beliefs.

Table 3. General Linear Model (GLM) analysis of the effects of independent variables on supporting beliefs (PC 2) for all three large carnivore species.

Effect	Wilks' Λ	F	Hypothesis df	Error df	*p*	Partial η^2
Knowledge	0.945	14.931	3	769.0	<0.001	0.055
Gender	0.977	6.084	3	769.0	<0.001	0.023
Education level	0.987	1.621	6	1538.0	0.137	0.006
Age	0.993	1.679	3	769.0	0.170	0.007
Survey delivery—visit	0.997	0.892	3	769.0	0.445	0.003
Survey delivery—year	0.998	0.410	3	769.0	0.746	0.002
Freq. of visits	0.984	1.406	9	1871.7	0.180	0.005

On the other hand, the results of multivariate test on opposing beliefs for all three species (Table 4) show the significant influence of knowledge, gender and education level. Again, knowledge has a moderate, but the strongest, effect on participants' beliefs.

Table 4. General Linear Model (GLM) analysis of the effects of independent variables on opposing beliefs (PC 1) for all three large carnivore species.

Effect	Wilks' Λ	F	Hypothesis df	Error df	*p*	Partial η^2
Knowledge	0.941	15.931	3	769.0	<0.001	0.059
Gender	0.985	3.965	3	769.0	0.008	0.015
Education level	0.969	4.011	6	1538.0	0.001	0.015
Freq. of visits	0.988	1.059	9	1871.7	0.390	0.004
Survey delivery—visit	0.995	1.186	3	769.0	0.314	0.005
Survey delivery—year	0.998	0.421	3	769.0	0.738	0.002
Age	0.996	1.010	3	769.0	0.388	0.004

3.2. The Results of Univariate Statistics

When we analyzed the data for individual species, we found that, for all three species, supporting beliefs (PC 2) are influenced by knowledge and education level (Table 5). Respondents' ratings were influenced by gender only for lynx, but strongly enough to produce significant effects in the multivariate statistics (Table 3). Still, the highest effect on supporting beliefs can be attributed to the knowledge of participants, which was evaluated as moderate.

Table 5. GLM univariate analysis of the effects of independent variables on supporting beliefs (PC 2) for individual species.

Source	Type III Sum of Squares	df	Mean Square	F	*p*	Partial η^2
BEAR						
Knowledge	13.630	1	13.630	36.512	<0.001	0.045
Education level	3.343	2	1.672	4.478	0.012	0.011

Gender	0.414	1	0.414	1.108	0.293	0.001
Survey delivery—visit	0.086	1	0.086	0.229	0.632	0.000
Survey delivery—year	0.111	1	0.111	0.297	0.586	0.000
Age	0.108	1	0.108	0.289	0.591	0.000
Freq. of visits	0.592	3	0.197	0.528	0.663	0.002
WOLF						
Knowledge	13.728	1	13.728	36.735	<0.001	0.045
Education level	3.372	2	1.686	4.511	0.011	0.012
Gender	0.663	1	0.663	1.773	0.183	0.002
Age	0.515	1	0.515	1.378	0.241	0.002
Survey delivery—visit	0.169	1	0.169	0.452	0.502	0.001
Survey delivery—year	0.097	1	0.097	0.259	0.611	0.000
Freq. of visits	0.515	3	0.172	0.459	0.711	0.002
LYNX						
Knowledge	15.422	1	15.422	44.361	<0.001	0.054
Gender	2.373	1	2.373	6.826	0.009	0.009
Education level	3.297	2	1.649	4.743	0.009	0.012
Age	0.603	1	0.603	1.733	0.188	0.002
Freq. of visits	0.900	3	0.300	0.863	0.460	0.003
Survey delivery—visit	0.419	1	0.419	1.206	0.272	0.002
Survey delivery—year	0.008	1	0.008	0.023	0.881	0.000

Opposing beliefs (PC 1) are, in the same way as supporting beliefs, influenced by knowledge, education level (Table 6) and also gender. The highest effect on opposing beliefs can be attributed to the knowledge of participants, similarly to supporting beliefs (Table 5).

Table 6. GLM univariate analysis of the effects of independent variables on opposing beliefs (PC 1) for individual species.

Source	Type III Sum of Squares	df	Mean Square	F	*p*	Partial η^2
BEAR						
Knowledge	17.392	1	17.392	35.454	<0.001	0.044
Education level	5.644	2	2.822	5.753	0.003	0.015
Gender	3.997	1	3.997	8.148	0.004	0.010
Freq. of visits	1.860	3	0.620	1.264	0.286	0.005
Survey delivery—visit	1.310	1	1.310	2.671	0.103	0.003
Survey delivery—year	0.357	1	0.357	0.728	0.394	0.001
Age	0.040	1	0.040	0.082	0.775	0.000
WOLF						
Knowledge	16.292	1	16.292	31.977	<0.001	0.040
Education level	5.949	2	2.974	5.838	0.003	0.015
Gender	2.734	1	2.734	5.367	0.021	0.007
Survey delivery—visit	1.634	1	1.634	3.206	0.074	0.004
Survey delivery—year	0.555	1	0.555	1.090	0.297	0.001
Age	0.296	1	0.296	0.581	0.446	0.001
Freq. of visits	1.267	3	0.422	0.829	0.478	0.003
LYNX						
Knowledge	22.042	1	22.042	44.167	<0.001	0.054
Education level	8.838	2	4.419	8.855	<0.001	0.022
Gender	3.998	1	3.998	8.011	0.005	0.010

Freq. of visits	2.271	3	0.757	1.517	0.209	0.006
Survey delivery—visit	1.039	1	1.039	2.081	0.150	0.003
Survey delivery—year	0.487	1	0.487	0.977	0.323	0.001
Age	0.055	1	0.055	0.110	0.740	0.000

3.3. Correlations between Beliefs and Knowledge

When controlled for the effect of gender, education level, reported number of visits to the zoo and survey delivery, strong correlations emerged between supporting ratings and between opposing ratings for all species (Table 7). Low and negative correlations were found between supporting and opposing dimensions for each species: the respondents agreed with supporting statements when they agreed less with opposing statements. Still lower correlations were found between knowledge scores and supporting/opposing belief ratings for individual species.

Table 7. Partial correlations between visitors' beliefs and knowledge.

Partial Correlations	Correlation Value
Wolf vs. lynx supporting beliefs	0.936
Wolf vs. bear supporting beliefs	0.943
Lynx vs. bear supporting beliefs	0.904
Wolf vs. lynx opposing beliefs	0.932
Wolf vs. bear opposing beliefs	0.948
Lynx vs. bear opposing beliefs	0.904
Lynx supporting vs. opposing beliefs	−0.340
Wolf supporting vs. opposing beliefs	−0.345
Bear supporting vs. opposing beliefs	−0.353
Lynx supporting beliefs vs. knowledge	0.237
Wolf supporting beliefs vs. knowledge	0.217
Bear supporting beliefs vs. knowledge	0.211
Lynx opposing beliefs vs. knowledge	−0.231
Wolf opposing beliefs vs. knowledge	−0.202
Bear opposing beliefs vs. knowledge	−0.202

Note—all $p < 0.001$; control variables: gender, education level, freq. of visits and survey delivery; supporting belief (PC 2); opposing belief (PC 1).

3.4. Differences in Participants' Belief Ratings and Knowledge Scores According to Independent Variables

In general, the mean scores of supportive statements were high: for all three species, they were between 4.41 and 4.43 on the 5-point scale. The mean scores for opposing belief ranged between 3.54 and 3.68 on the same scale. Independent variables that did not show significant effects in the multivariate and univariate statistics were excluded from this section. Only gender and education level effects are described (Tables 8 and 9).

3.4.1. Effect of Gender on Belief Statements and Knowledge Score

We found statistically significant differences in participants' ratings of opposing beliefs for all species (Table 8: females agreed less than males with statements that oppose large carnivore conservation than males). As for supporting beliefs, males supported lynx conservation more than females. Yet the difference, although statistically significant, was small. Male participants also scored higher in knowledge than females.

Table 8. Effect of gender on ratings of belief statements and knowledge score.

Belief/Knowledge	Female		Male		Mann–Whitney U	
	M	SD	M	SD	Z	p
Lynx—sup	4.39	0.64	4.48	0.60	−2.037	0.042
Wolf—sup	4.39	0.64	4.44	0.65	−1.406	0.160
Bear—sup	4.40	0.63	4.43	0.66	−0.990	0.322
Lynx—opp	3.59	0.78	3.82	0.75	−4.424	<0.001
Wolf—opp	3.49	0.77	3.67	0.75	−3.650	<0.001
Bear—opp	3.47	0.75	3.65	0.74	−3.646	<0.001
Knowledge	3.46	1.54	4.08	1.43	−5.873	<0.001

Note: M = mean; SD = standard deviation; sup = supporting belief (PC 2); opp = opposing belief (PC 1); lower values in PC 1 indicate more opposing belief.

3.4.2. Effect of Education Level on Belief Statements and Knowledge Score

Participants who are formally educated to a higher level display greater support for and less opposition to conservation of large carnivores (Kruskal–Wallis: all $p < 0.001$) (Table 9). On the other hand, we found smaller, but still statistically significant, differences in participants' knowledge according to education level (Kruskal–Wallis: $p = 0.002$). Post-hoc comparisons revealed the significant differences between primary school- vs. high school-level educated participants and primary school- vs. university-level educated participants. High school- and university-level educated participants did not significantly differ in knowledge.

Table 9. Effect of education level on ratings of belief statements and knowledge score.

Belief/ Knowledge	Primary School or Less		High School		University or More		Kruskal–Wallis			Post-hoc Bonferroni-Corrected p-Values		
	M	SD	M	SD	M	SD	χ^2	df	p	P/H	P/U	H/U
Lynx—sup	4.11	0.64	4.38	0.66	4.52	0.55	26.627	2	<0.001	0.001	<0.001	0.019
Wolf—sup	4.09	0.56	4.36	0.69	4.50	0.57	30.584	2	<0.001	<0.001	<0.001	0.018
Bear—sup	4.10	0.59	4.37	0.69	4.50	0.56	28.333	2	<0.001	0.001	<0.001	0.023
Lynx—opp	3.20	0.85	3.57	0.79	3.84	0.71	43.958	2	<0.001	0.006	<0.001	<0.001
Wolf—opp	3.09	0.80	3.46	0.77	3.71	0.73	41.289	2	<0.001	0.005	<0.001	<0.001
Bear—opp	3.12	0.82	3.45	0.75	3.68	0.71	38.764	2	<0.001	0.011	<0.001	<0.001
Knowledge	3.02	1.56	3.66	1.49	3.83	1.52	12.185	2	0.002	0.026	0.002	0.396

Note–M = mean; SD = standard deviation; sup = supporting belief (PC 2); opp = opposing belief (PC 1); Bonferroni-corrected post-hoc Mann–Whitney tests' p-values: P/H—primary school or less vs. high school, P/U—primary school or less vs. university or more, and H/U—high school vs. university or more; lower values in PC 1 indicate more opposing belief.

4. Discussion

Our results show that the greatest impact on supporting and opposing beliefs related to all three large carnivore species can be attributed to knowledge and education level. Gender is also recognized to play a role in participants' ratings. All other independent variables produced no significant effects on participants' ratings.

4.1. The Effect of Knowledge on Conservation Beliefs

Knowledge has been identified as an important factor in the process of the formation of attitudes toward conservation action [9], although some authors have argued that the attitudes are probably predisposed [73]. Knowledge has been recognized as one of the most important factors among children, with attitudes just developing [74]. Beside theoretical knowledge, direct experiences with animals are, or can be, an effective precursor in forming positive attitudes towards animals [27]. In the case of large carnivores, direct

experiences of animals in nature are rare. Therefore, seeing species in a zoo setting can also be effective in forming positive attitudes [24]. Among all factors taken into account in the present study, knowledge had the greatest impact on both supporting and opposing conservation beliefs regarding large carnivores. Knowledge induced the formation of conservation-supporting beliefs for all three large carnivore species, but, even more importantly, it reduced the formation of conservation-opposing beliefs. People with less knowledge about the species expressed opposing beliefs more often than more knowledgeable people. The results suggest that teaching biological facts about large carnivores can improve overall public support for large carnivore conservation, most likely through demystifying the species and also through reducing fear.

Leisure time activities, such as zoo visits involving connection with animals, correlate with more knowledge of those animal species [75]. Human perceptions of animals depend not only on the amount of knowledge (factual knowledge), but also on its type (e.g., factual, conceptual or procedural) [76]. Therefore, it has been concluded that human perception correlates with the type of knowledge transfer (e.g., egocentric or anthropocentric) [77]. While attitudes are formed at a very young age, education plays an important role in the perception of animals and nature in general persisting into adulthood [78].

4.2. The Effect of Gender on Conservation Beliefs and Knowledge

The influence of gender was found to be less uniform. Gender had an impact on belief ratings, but this was smaller than the impact of knowledge. Namely, it was found that gender had more influence on the opposing than supporting beliefs; it affected respondents' ratings of supporting and opposing beliefs related to lynx, and also opposing beliefs related to bears and wolves. Females displayed more opposition to all three large carnivore species' conservation than males. The results are in line with previous research that also reported gender differences in attitudes, where females expressed greater fear of large carnivores than males [13,23]. Consequently, gender was proposed as one of the most predictive factors in attitude formation [15]. The reason for the small but statistically significant difference in supportive beliefs between males and females in relation to lynx should be further explored.

Furthermore, males in the present study achieved higher knowledge scores than females, and reported less conservation-opposing beliefs. Other studies also showed that more knowledge about the species was not necessarily related to more positive attitudes in females [39]. Attitudes towards animals and knowledge about them are closely related to the amount of fear one experiences—they depend on individuals' perceptions of potential dangerousness [24,41,74]. Consequently, environmental knowledge was set as an important factor to be controlled [28].

The present study's results suggest that gender-specific educational strategies should also be considered.

4.3. The Effect of Education Level on Conservation Beliefs and Knowledge

Education level influenced supporting and opposing beliefs related to all three species. In other studies [41,75], it was found that a higher education level correlated with more positive attitudes towards animals. In the present study, the results show that a higher education level induced the formation of less opposing beliefs, representing the main concern of conservation actions.

Although the respondents' degree of knowledge was significantly affected by education level, there was no difference between high school- and university-level participants. Significant differences in knowledge were found in comparison with the primary school educated group. In other research [41], a correlation between respondents' knowledge and type of education institution was found. If, as shown in the present study, knowledge does not necessarily correlate with education level, then education in formal institutions does not address the topic sufficiently. As already proposed for primary school teachers, higher-level educators should engage students in activities that promote

close contact with living organisms [29]. Again, this emphasizes the great educational potential of zoos as an informal learning environment, supplementing the instructions carried out in formal learning institutions. As promoters of species conservation, zoos have a great opportunity, and also responsibility, to provide quality information and experiences for the visitors. As already pointed out, the mission of zoos is not just to provide information, but they must aim to form positive attitudes toward nature among the visitors as well [47], using large carnivores as ambassador species of biodiversity conservation [79].

5. Conclusions

This study indicates that knowledge is an important factor that significantly shapes the attitudes of visitors towards all three large carnivore species.

The authors of the baseline study proposed separate designs of conservation and management plans for different species of large carnivores, following the differences in participants' ratings of individual species [19]. However, in contrast to our study, theirs was conducted on the general public. Because in our case, the differences in participants' conservation belief ratings between individual species were almost non-existent, we can conclude that zoo conservation education needs to focus more on females and visitors of lower education levels than on individual species.

Visiting a zoo without engaging in any guided educational activities does not change attitudes and beliefs regarding large carnivores. At our zoo, casual visitors can learn about the biology of large carnivores, mainly from information tables. Information about human–animal conflicts and their management is usually gained only through guided tours or workshops.

In the present study, only casual visitors participated. In order to obtain data on the efficiency of pedagogical activities, participants from guided tours and workshops should be included in future research. Since previous studies also stressed the effectiveness of educational activities in zoos [52] and other out-of-school settings [43], the evaluation of such educational activities regarding large carnivores is encouraged.

By determining the factors influencing an individual's knowledge about large carnivores and beliefs about their conservation, the results of this study contribute to existing knowledge, as they serve as a theoretical basis for planning educational activities in conservation biology.

Author Contributions: Conceptualization, V.O. and I.T.; methodology, V.O., A.M.S. and I.T.; software, I.T.; validation, I.T., A.M.S. and A.Š.; formal analysis, V.O., A.M.S. and I.T.; investigation, V.O., A.M.S. and I.T.; resources, I.T.; data curation, V.O., A.M.S. and I.T.; writing—original draft preparation, V.O. and I.T.; writing—review and editing, all authors.; visualization, I.T.; supervision, I.T. and A.Š. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted according to the Slovenian legislation—Personal Data Protection Act (Official Gazette of the Republic of Slovenia), No. 94/07—official consolidated text and 177/20 (citing http://www.pisrs.si/Pis.web/pregledPredpisa?id=ZAKO3906&d-49683-s=1&d-49683-p=1&d-49683-o=2, accessed on 30 November 2021) and guidelines of the Ethics committee of the University of Ljubljana (citing https://www.ff.uni-lj.si/fakulteta/komisija-za-etiko, accessed on 30 November 2021).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Acknowledgments: The authors thank all the students for their help in conducting the survey and the Ljubljana Zoo, which made the research possible. They also thank Slovenian Research Agency (ARRS) for enabling open access publication of the manuscript through project N1-0105.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

QUESTIONNAIRE ON ATTITUDE TO AND KNOWLEDGE OF THE LARGE CARNIVORE ISSUES

Dear visitors of the Ljubljana Zoo. We ask you to take part in an anonymous survey, which covers the attitudes towards and knowledge of the issues regarding large carnivores. Your cooperation will help to improve pedagogical work and will influence the development and improvement of our nature conservation activities.

I. For the purposes of statistical data analysis, please fill in the sections below.

1. **Gender:** ☐ Female ☐ Male
2. **Age:** _____ years.
3. **Place of residence:** _____
4. **Education level:**
   a. Uncompleted primary and secondary school b. Completed primary and secondary school
   c. Completed upper secondary school d. Higher education
5. **How many times you visit the zoo?**
   a) every two months b) twice a year c) once a year d) less than once per year
6. **Do you have a pet?**
   a. **Dog** ☐ b. **Cat** ☐ c. **I am not a pet owner** ☐

II. Please answer the questions that test your knowledge of large carnivores living in Slovenia. Circle only one answer that you think is correct, or the answer that best describes your opinion.

1) **All large carnivore species** (brown bear, grey wolf and Eurasian lynx) are protected in Slovenia due to their endangerment.
   a. Yes.
   b. No.
   c. Not sure.

2) Compensation for damage caused by large carnivores to farmers is paid by the state.
   a. Yes.
   b. No.
   c. Not sure.

3) How do **Eurasian lynx** live?
   a. In couple.
   b. Solitary.
   c. In social group.
   d. Not sure.

4) The **Eurasian lynx** became extinct in Slovenia in the past, but then it was reintroduced.
   a. Yes.
   b. No.
   c. Not sure.

5) **Brown bears** in Slovenia diet mainly consists of:
   a. food of animal origin (game, carrion ...),
   b. food of plant origin (plants and their fruits),
   c. food of animal and plant origin in approximately equal quantities,
   d. not sure.

(Questionnaire design: mag. Aleksandra Majič Skrbinšek and doc. dr. Anja Zemanič)

6) The weight of an average adult male **grey wolf** in Slovenia is:
   a. 1-20 kilos,
   b. 21-40 kilos,
   c. 41-60 kilos,
   d. more than 60 kilos,
   e. Not sure.

7) Of how many members consists an average **wolf pack** in Slovenia?
   a. 1-10 wolves.
   b. 11-20 wolves.
   c. 21-30 wolves.
   d. More than 30 wolves.
   e. Not sure.

III. The table below lists the claims that relate to your support for the protection of a particular large carnivore species. Please rate your agreement with each statement FOR EACH ANIMAL SEPARATELY on a scale of 1 to 5.

Scale meaning:

1 – completely disagree, 2 – disagree, 3 – do not have an opinion, 4 – agree, 5 – completely agree

N	STATEMENT	LYNX	WOLF	BEAR
1	We should share the responsibility for conserving these animals.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
2	There is a high risk of human injuries.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
3	There is **no need** for conservation in Slovenia because there are populations in other countries.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
4	I want these animals to be present in Slovenia, even though I may never see them in the wild.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
5	We may use these animals as a valuable game species.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
6	Costs of compensation, research and monitoring are too high.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
7	They may have serious negative impact on livestock farming.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
8	These animals can have positive impact on balance of organisms.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
9	We need to preserve these animals for future generations.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
10	These animals compete with hunters over game such as deer and roe deer.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
11	It is hard to predict the effects of extermination.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
12	These animals may have serious negative impact on deer and roe deer numbers.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Thank you for cooperation!

**** Protection of potential personal data: all obtained personal data will be used exclusively for one-time communication and statistical data processing. The survey authors undertake to protect any personal data collected in the survey following the Personal Data Protection Act and not pass it on to third parties.*

(in one case, no personal data were collected)

Questionnaire design: mag. Aleksandra Majić Skrbinšek and doc. dr. Ideal Tomažič

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3 RAZPRAVA IN SKLEPI

3.1 RAZPRAVA

V nadaljevanju so predstavljeni dejavniki vpliva, pri katerih smo zaznali povezavo z oblikovanjem stališč in količino znanja. Zaznan vpliv dejavnikov med raziskavo smo primerjali z zaključki preteklih študij in opredelili njihovo skladnost ali možne razlage za neskladje ter izpostavili pomen za nadaljnje raziskovanje.

3.1.1 Znanje in vpliv pouka na oblikovanje stališč do velikih zveri

Kljub temu da se predpostavlja, da je čustvena komponenta stališča posameznika lahko tudi dedna (Clayton in sod., 2009), pa je bilo znanje že prepoznano kot pomemben (Kellert, 1994) ali celo eden najpomembnejših (Prokop in Tunnicliffe, 2008) dejavnikov, ki sodeluje v procesu oblikovanja stališč, predvsem pri otrocih. Rezultati raziskave med obiskovalci Živalskega vrta Ljubljana (glej Oražem in sod., 2022) kažejo, da znanje pomembno sooblikuje stališča obiskovalcev do vseh treh vrst velikih zveri. Tudi nekatere pretekle študije so izpostavile pomen izobraževanja v živalskih vrtovih (Wünschmann in sod., 2017) in drugih izvenšolskih ustanovah (glej Oražem in sod., 2019). Da bi povsem razumeli vpliv izobraževalnih dejavnosti živalskih vrtov kot neformalnih učnih okolij, je treba nadalje raziskati neposreden vpliv pouka.

Rezultati raziskave stališč do volkov in znanja o njih v srednješolskem strokovnem izobraževanju (glej Oražem in Tomažič, 2018) kažejo, da je znanje o volkovih med srednješolci precej manjše, saj je bil na preizkusu znanja povprečen dosežek dijakov le 43 %. Največji primanjkljaj se kaže v znanju ekologije vrste. Polovica dijakov je izrazila prepričanje, da volkovi predstavljajo nevarnost za človeka, kljub temu da v Sloveniji v zadnjih 100 letih napadi volkov na ljudi niso bili zabeleženi. Znani pa so napadi volkov na ljudi iz drugih krajev (Linnell in sod., 2021). Čeprav dijaki niso bili izpostavljeni realni grožnji ali bili o njej obveščeni, pa se lahko tovrstno dojemanje oblikuje na podlagi prebiranja knjig, ogleda oddaj ali filmov, kjer so volkovi predstavljeni kot hladnokrvni plenilci (Fogleman, 1989), saj tovrstna negativna informacija pomembno vpliva na razvoj strahu (Rachman, 2004). Za boljše razumevanje vzročno-posledičnosti tega pojava so potrebne nadaljnje, presečne in longitudinalne študije.

Tudi v raziskavi stališč do volkov in znanja o njih med gimnazijci in veterinarskimi tehniki (glej Oražem in sod., 2019) smo ugotovili, da je imelo znanje največji vpliv na izražanje stališč dijakov, kar sovpada z izsledki preteklih študij (glej Oražem in Tomažič, 2018; Tikka in sod., 2000). Dijaki z več znanja so izrazili izrazito bolj naklonjena stališča

do volkov. Kellert (1996) je predhodno že opredelil izobraževanje kot enega najpomembnejših dejavnikov vpliva na izoblikovanje stališč. Kljub temu pa je potrebna pazljivost pri uporabi znanja kot orodja za doseganje bolj prookoljskih stališč posameznika. Nekateri avtorji (Ho in sod., 2019) so v tem pogledu izpostavili pomembnost naravoslovnega znanja, saj lahko znanje, ki temelji na dejstvih, pripomore k podpori javnosti do naravoslovja in tehnologije v splošnem. Ravno nasprotno pa naj bi veljalo za subjektivno znanje, ki lahko vodi v manj podpore. Izpostavili so, da obe dimenziji znanja pozitivno vplivata na pozornost do medijskih objav in učnih tem. Teme o volkovih in drugih velikih zvereh lahko hitro pridobijo pozornost učencev, saj jih pritegne tako karizmatični kot tudi plenilski vidik vrst. Predvsem predhodno subjektivno znanje lahko bodisi negativno bodisi pozitivno vpliva na stališča do volkov ali drugih velikih zveri. Prav tako ima tudi pomanjkljivo znanje o ekologiji vrste lahko negativen vpliv na stališča posameznika (Røskaft in sod., 2003). Poleg ekološkega vidika bi morale biti v izobraževalne aktivnosti vključene tudi informacije o primernem vedenju na območju zveri (Johansson in Karlsson, 2011) in primeri učinkovitih praks za preprečevanje konfliktov (Kikvidze in Tevzadze, 2015), k bolj pozitivnim stališčem in k več znanja pa naj bi doprinesli tudi krajši izobraževalni programi (Campbell Bradley in sod., 1999; Prokop in sod., 2007). Johansson in Karlsson (2011) sta izpostavila, da je pomembno tudi zmanjšanje strahu pri posamezniku, zato je nujno, da izobraževalni programi posredujejo informacije o primernem vedenju ljudi, ne le o značilnostih vedenja velikih zveri. Ta vidik je pomembno upoštevati predvsem pri načrtovanju izobraževalnih programov za deležnike s področja kmetijstva. Barney in sod. (2005) so na primeru delfinov opozorili, da le naklonjena stališča ne vodijo nujno do prookoljskega vedenja posameznika, kar bi lahko veljalo tudi za velike zveri, zlasti če je njegovo znanje o teh vrstah pomanjkljivo.

Rezultati raziskave stališč o volkovih in znanja o njih med gimnazijci in veterinarskimi tehniki (glej Oražem in sod., 2019) kažejo, da so vsi izobraževalni pristopi (klasičen frontalni pouk, pouk s poudarkom na aktivnosti dijakov v šolskem okolju in pouk s poudarkom na aktivnosti dijakov v spremenjenem izvenšolskem – univerzitetnem okolju) vplivali na znanje dijakov, saj so na preizkusu po izvedeni delavnici vsi izkazali znatno večje znanje. Kljub temu da so vsi pristopi prispevali k dvigu znanja, pa nobeden ni prispeval k večji zainteresiranosti za učenje o volkovih. Predvidevamo, da bi lahko v prihodnje vključena izkušnja z volkovi (npr. opazovanje osebkov v živalskem vrtu) vplivala na dvig zainteresiranosti, saj bi vplivala na čustva dijakov in s tem na njihov interes (Sherwood in sod., 1989; Hummel in Randler, 2010). Kljub temu pa so demonstrirani načini poučevanja prinesli zanimive izsledke. Najučinkovitejša z vidika pridobitve znanja in naklonjenih stališč je bila delavnica, ki se je odvila izven šole, v prostorih Biotehniške fakultete UL. Izvedba delavnice je bila identična šolski, vodil jo je isti učitelj. Razliko v količini pridobljenega znanja in spremembi stališč lahko razložimo s spremembo učnega okolja, ki lahko pozitivno vpliva na interes dijakov (Williams in

Williams, 2011; Wüst-Ackermann in sod., 2018). Razliko bi lahko pripisali tudi sestavi vzorca dijakov, saj je bilo na univerzitetni delavnici udeleženih več veterinarskih tehnikov, ki so že pred poukom izkazali višjo stopnjo podpore volkom in več znanja o vrsti, kar lahko opredelimo tudi kot omejitev raziskave. Ta tip delavnice je najizrazitejše doprinesel k dvigu pozitivnosti stališč, saj je prispeval k zmanjšanju strahu dijakov pred volkovi, kar je skladno s predpostavko kognitivnega modela (Armfield, 2006). Delavnica na šoli, v obliki frontalnega pouka, je prav tako doprinesla k večjemu sprejemanju volkov, vendar ta doprinos ni bil tako izrazit kot pri drugih dveh načinih izvedbe delavnice.

Pri raziskavi stališč do medvedov in znanja o njih (glej Oražem in sod., 2021) smo učinek delavnic preverjali le posredno, kar predstavlja omejitev raziskave. Kljub temu rezultati kažejo, da je pouk pomembno vplival na količino znanja pri učencih in dijakih. Večja količina znanja je nadalje spodbudila interes za učenje o medvedih, pozitivno je vplivala na stališča, usmerjena v varstvo vrste, in v določeni meri zmanjšala strah pred medvedi. Tudi predhodne študije so izpostavile ugoden vpliv znanja na stališča učencev ali dijakov ter splošne javnosti (glej Oražem in sod., 2019; Prokop in Kubiatko, 2008; Sherwood in sod., 1989) do velikih zveri. Znanje je bilo že opredeljeno kot pomemben moderator pri oblikovanju čustev in prepričanj o volkovih, ne pa tudi o medvedih (Prokop in sod., 2011). Predhodne študije (Gore in sod., 2008; Muris in sod., 2003) so izpostavile tudi pomen verbalne informacije na čustva pri otrocih, ki je lahko bodisi pozitiven bodisi negativen. Ker je rjavi medved vrsta, ki v človeku vzbuja strah, bi lahko učenci in dijaki ob usvojitvi novega znanja o vrsti postali previdnejši glede morebitne grožnje vrste za varnost posameznika. Prihodnje izobraževalne aktivnosti bi zato morale vključevati družbenoznanstvene teme o medvedih, da bi na ta način znižali dojemanje medveda kot grožnje, kar je bilo že predlagano za izobraževalne aktivnosti za varstvo volkov (glej Oražem in sod., 2019), osredotočiti pa bi se morale tudi na za človeka in lokalno okolje uporabni vidik vrste (Gusset in sod., 2008). Raziskave med splošno javnostjo so izpostavile prepoznavanje pomena medveda za lokalno okolje in posameznika (Majić Skrbinšek in sod., 2019), ne pa tudi pomena volka (Mavec in Majić Skrbinšek, 2020), kar kaže na pomembnost usmeritve prihodnjih raziskav na povezavo med vključevanjem tem s področja ekosistemskih storitev v izobraževalne in komunikacijske aktivnosti in med stališči.

Pomemben vpliv znanja o velikih zvereh pa smo zasledili tudi v povezavi z varstvenimi prepričanji obiskovalcev živalskega vrta (glej Oražem in sod., 2022). Več znanja je imelo pozitiven vpliv na večjo podporo ohranjanju vrst, hkrati pa na omilitev varstvu nasprotujočih prepričanj obiskovalcev. V omenjeni raziskavi se je izkazalo, da ima znanje posameznika največji vpliv na prepričanja obiskovalcev v povezavi z varstvom velikih zveri. Ključnega pomena je tudi ugotovitev, da je več znanja povezano predvsem s spremembo nenaklonjenih prepričanj v bolj naklonjena do vseh treh vrst velikih zveri. Le pri risu se je izkazalo znanje pomembno tudi pri oblikovanju in okrepitvi naklonjenih

prepričanj.

Rezultati o vplivu količine znanja na oblikovanje pozitivnih stališč so skladni s predhodnimi študijami (Barney in sod., 2005; Kaczensky, 2000; Kaczensky in sod., 2004; Lukas in Ross, 2005; Randler in sod., 2020; Tomažič in Šorgo, 2017) in kažejo na pomembnost učenja o biologiji velikih zveri v povezavi z odpravljanjem napačnih predstav in posledično višjim sprejemanjem vrst v javnosti.

3.1.2 Vpliv stopnje in smeri izobrazbe na znanje in stališča o velikih zvereh

V naši raziskavi je tako na znanje kot na stališča dijakov pomembno vplivala smer izobraževanja. Veterinarski tehniki so v primerjavi z gimnazijci (glej Oražem in sod., 2019) izkazali več znanja, predvsem pa bolj pozitivna stališča do volkov, kar lahko odraža njihov primarni interes za izbor tovrstnega izobraževanja in nadaljnje opravljanje poklica. Rezultati so skladni s predhodnimi študijami (glej Oražem in Tomažič, 2018; Tikka in sod., 2000), ki so že potrdile povezavo med smerjo izobraževanja, znanjem in stališči. Tudi v primerjavi z naravovarstvenimi in kmetijsko-podjetniškimi tehniki (glej Oražem in Tomažič, 2018) so veterinarski tehniki izkazali najbolj pozitivna stališča do volkov in največ znanja o le-teh. Razlike med izobraževalnimi programi so bile najočitnejše v prvem letniku šolanja. Prokop in Tunniclife (2010) sta izpostavila, da so učenci v starosti 10–15 let bolj naklonjeni manj priljubljenim živalskim vrstam, kamor sta uvrstila tudi volka kot plenilsko vrsto. Kljub naklonjenosti omenjeni vrsti pa so stališča otrok do le-teh lahko negativna. Poleg splošnega utilitarnega pogleda na živali bi lahko ta tendenca pojasnila bolj odklonilna stališča do volkov med dijaki prvih letnikov programa kmetijsko-podjetniški tehnik. V drugem letniku šolanja so dijaki izražali manj strahu pred volkovi kot dijaki tretjih letnikov. Avtorji preteklih študij (Berninger in sod., 2009; Kellert in sod., 1996) so izpostavili, da novo pridobljeno znanje lahko spodbudi ali utrdi že oblikovana stališča. Pričakovali bi, da se bodo v času izobraževanja pozitivna stališča dijakov v tretjem letniku dodatno okrepila, vendar je njihov strah do volkov ponovno narasel, interes za učenje pa upadel. Trend bi lahko pojasnili z naraščajočo starostjo dijakov, kar v skladu s predhodnimi študijami kaže, da z leti naklonjenost velikim zverem upada (Binngießer in Randler 2015; Consorte-McCrea in sod., 2016; Johnson, 1974; Prokop in Kubiatko, 2008; Williams in sod., 2002). Pomembno je tudi upoštevati, da so na splošno bolj izražena stališča najstniška značilnost. Na upad pozornosti pa lahko vplivajo tudi drugi dejavniki, kot so upad splošne učne uspešnosti (Deci in Ryan, 1985), neučinkovite učne navade in splošno negativna stališča do psihološkega objekta (Çimer, 2012). Vendar na pomanjkanje interesa ne vplivajo le notranji dejavniki, temveč tudi širši zunanji dejavniki, kot je socialno okolje, znotraj tega pa glavni socialni dejavniki, med katere sodijo prijatelji, družina, tudi učitelji. Ti lahko vplivajo na posameznikova stališča,

pa tudi na samo vedenje v povezavi z izobraževanjem (Deci in Ryan, 1985).

Ker so kmetijsko-podjetniški tehniki izkazali najmanj pozitivna stališča in imeli najmanj znanja, lahko sklepamo, da se predvsem šolarji z izrazitejšim utilitarističnim pogledom odločajo za to smer izobraževanja, kar se odraža tudi v večji podpori lovu. Utilitaristični pogled kmetijcev je bil že predhodno povezan z negativnimi stališči do velikih zveri (Schlegel in Rupf, 2010). Nasprotno pa se za izobraževanje v naravovarstveni smeri odločajo šolarji, ki imajo izrazitejši ohranitveni pogled na naravo in posledično bolj nasprotujejo lovu. V nasprotju z omenjenima programoma gre več znanja veterinarskih tehnikov o volkovih pripisati tudi pridobivanju znanja o udomačenih karnivorih (npr. psih), ki ga lahko projicirajo na volka. Tudi drugi avtorji (Schlegel in Rupf, 2010) so zaznali razlike med različnimi smermi izobraževanja v povezavi s stališči do velikih zveri. Ključno je tudi poudariti, da samo pridobivanje znanja ni omejeno le na formalno izobraževanje. Predvsem pomanjkanje ekološkega znanja lahko privede k nižji sprejetosti velikih zveri, kar se v našem primeru najverjetneje odraža pri kmetijsko-podjetniških tehnikih. Tudi pretekle študije, ki so zajemale lokalne prebivalce in kmete (Chavez in sod., 2005; Ericsson in Heberlein, 2003; Williams in sod., 2002), so izpostavile podobne zaključke. Čeprav je naša raziskava zajemala le srednješolce, pa lahko trend stališč in znanja apliciramo tudi na odraslo populacijo. Ker je bila raziskava izvedena kot presečna študija, ki je analizirala posnetek stanja v določenem časovnem obdobju, je smiselno, da prihodnje raziskave za celovitejše razumevanje vpliva znanja na spremembo stališč zajamejo daljše časovno obdobje.

Rezultati kažejo, da stališča do medvedov variirajo glede na stopnjo izobraževanja (glej Oražem in sod., 2021). Učenci tretje triade osnovne šole so izkazali izrazito manj znanja o medvedih kot srednješolci, njihova stališča pa so bila kljub temu nekoliko bolj pozitivna. Srednješolci so imeli nekoliko manj naklonjena stališča varstvu vrste. Tudi pretekle študije so že izpostavile razlike v stališčih in znanju v povezavi s starostjo (Tomažič, 2008).

Rezultati raziskave stališč in znanja obiskovalcev živalskega vrta (glej Oražem in sod., 2022), ki je zajemala odraslo populacijo, kažejo vpliv ravni izobrazbe na podporo in nasprotovanje varstvu zveri, kar so poročali tudi predhodni avtorji (Kellert in Berry, 1980; Majić Skrbinšek, 2019, 2020; Mavec in Majić Skrbinšek, 2020; Schlegel in Rupf, 2010). Vendar pa smo pri raziskavi naleteli na pomemben trend, ki kaže, da stopnja izobrazbe vpliva predvsem na izoblikovanje varstvu manj nasprotujočih prepričanj, kar je osrednji cilj pri vključevanju širše javnosti v varstvene in upravljavske aktivnosti na področju velikih zveri. Nasprotno pa stopnja izobrazbe ni imela pomembnega vpliva na količino znanja anketirancev, kar kaže na drugačen trend, kot je opisano v preteklih študijah (glej Oražem in Tomažič, 2018; Schlegel in Rupf, 2010), ki potrjujejo pozitivno povezavo med količino znanja in stopnjo izobrazbe. Drugačen trend naše raziskave bi lahko pojasnili z

nezadostno naslovljenostjo teme v sklopu formalnega izobraževanja. Kot velja za osnovnošolske učitelje (Lindemann-Matthies, 2005), bi se morali tudi učitelji na višjih ravneh posluževati aktivnosti, ki promovirajo stik z živimi organizmi. Tu je treba izpostaviti pomembnost neformalnih učnih ustanov, tudi živalskega vrta, ki se v večji meri poslužujejo izkušenjskega učenja.

3.1.3 Vpliv spola na znanje o velikih zvereh in stališča do njih

Rezultati nekaterih predhodnih študij kažejo, da je spol izjemno pomemben dejavnik vpliva v procesu oblikovanja stališč do prostoživečih živali (npr. Kellert in Berry, 1987; Musila in sod., 2018). V nasprotju z oblikovanim splošnim mnenjem in rezultati študij, ki kažejo na s spolom pogojene razlike v stališčih do volkov (npr. Kellert in Berry, 1987; Musila in sod., 2018; Prokop in Tunnicliffe, 2010; Tikka in sod., 2000), pri raziskavi stališč do volkov in znanja o njih med srednješolci nismo zaznali izrazitih razlik med spoloma. Pri izražanju strahu smo zaznali trend nekoliko večje naklonjenosti dijakinj za varstvo volkov (glej Oražem in Tomažič, 2018; Oražem in sod., 2019). Podobno so zaznali tudi Williams in sod. (2002) v metaanalizi stališč do volkov. Pri analizi podatkov smo zaznali tudi večji interes za učenje pri dijakinjah, čeprav so nekatere pretekle študije izpostavile višji interes pri moških (Lindemann-Matthies, 2005). Podoben interes v povezavi s spolom, kot smo ga zaznali med srednješolci, so zaznali tudi nekateri drugi avtorji (Glikman in sod., 2012). Iz rezultatov lahko sklepamo, da bodo – v našem primeru – dijakinje, ki izražajo nekoliko višji interes za varstvo volkov in posledično večji interes za učenje o vrsti, bolj verjetno izražale tudi proaktivno vedenje v smislu njihovega ohranjanja (Zelezny in sod., 2000). Zaznali smo tudi manjše nasprotovanje lovu med dijaki srednješolskega strokovnega izobraževanja (glej Oražem in Tomažič, 2018) v primerjavi z dijakinjami, na kar sta opozorila že Kellert in Berry (1987). Ženske naj bi zavzemale bolj humanistična in moralna stališča, posledično pa tudi bolj antropomorfna stališča do karizmatičnih živalskih vrst. Nasprotno naj bi se moški lažje poistovetili z lovom zaradi izrazitejšega utilitarističnega in dominionističnega pogleda na živali. Ob tem so dijaki izrazili večjo skrb za sinhrono delovanje celotnega ekosistema, kar lahko odraža tudi vloga lova v antropogenih ekosistemih. Poleg razlike med spoloma bi lahko bil rezultat naše raziskave pogojen tudi s smerjo izobraževanja, saj je večji delež dijakov obiskovalo program kmetijsko-podjetniški tehnik. Na večjo podporo lova med rejci so opozorili tudi avtorji predhodnih raziskav (npr. Treves in sod., 2013).

S spolom pogojene razlike smo zaznali tudi pri raziskovanju stališč osnovnošolcev in srednješolcev do medveda (glej Oražem in sod., 2021). Med moškimi smo zaznali manj izražen strah pred medvedi, kar so izpostavile že pretekle študije (Johansson in sod., 2012; Musila in sod., 2018; Prokop in sod., 2011, Tikka in sod., 2000). Večji strah med ženskami bi lahko razložili na podlagi predvidene ogroženosti zaradi možnosti poškodb

(Johansson in sod., 2019). Nekoliko višje zaznano zanimanje za učenje o medvedih med učenkami in dijakinjami je v skladu s preteklimi študijami (Braun in sod., 2018; Prokop in Kubiatko, 2008). Pri načrtovanju izobraževalnih aktivnosti na temo velikih zveri je tako ključno upoštevati večjo zainteresiranost za učenje med ženskami, in sicer tako o volkovih kot o medvedih, poleg tega pa tudi večjo prisotnost strahu do medvedov. Raziskave (glej Oražem in sod., 2021; Schlegel in Rupf, 2010) kažejo, da večja količina znanja o vrsti neposredno ne pripomore k bolj pozitivnim stališčem pri ženskah, vseeno pa je treba upoštevati in najti načine za zmanjšanje strahu (Prokop in Tunnicliffe, 2008; Prokop in sod., 2009).

Pri raziskovanju stališč obiskovalcev živalskega vrta do velikih zveri (glej Oražem in sod., 2022) smo zaznali vpliv spola na oblikovanje stališč. Ključna je ugotovitev, da spol vpliva predvsem na oblikovanje stališč, ki nasprotujejo ohranjanju vrst, z izjemo stališč do risa, kjer je bil vpliv spola zaznan tudi v povezavi s stališči, ki varstvo podpirajo. V nasprotju z drugimi študijami (Kellert, 1987; Røskaft in sod., 2003) so ženske izražale manj podpore varstvu vseh treh vrst velikih zveri.

Pri znanju o volkovih s spolom pogojene razlike niso bile zaznane (glej Oražem in Tomažič, 2018). Nasprotno so nekatere pretekle študije poročale o več znanja o prostoživečih vrstah med moškimi (npr. Dahlgren in sod., 1977; Kellert in Berry, 1987). Podobno smo zaznali tudi pri raziskovanju znanja med obiskovalci živalskega vrta (glej Oražem in sod., 2022). Moški so izkazali znatno večje znanje o velikih zvereh kot ženske, kar nakazuje, da morajo biti izobraževalne aktivnosti prilagojene glede na spol. Nekateri avtorji (Kellert in Berry, 1980) so že predlagali, da prostočasne aktivnosti, ki zajemajo izkušnje z živalmi, pomembno vplivajo na pridobivanje znanja, kar kaže na pomembnost izobraževanja v neformalnih učnih ustanovah, tudi živalskih vrtovih. Pomemben je tudi tip znanja, saj znanje o vrsti ne temelji le na pomnjenju dejstev (faktografskem znanju), temveč tudi na proceduralnem in konceptualnem znanju (Morgan in Gramann, 1989). Prav tako je izrednega pomena prenos znanja, kot je ekocentrični ali antropocentrični vidik (Hunter in Rinner, 2004).

3.1.4 Pomen izkušnje na znanje in stališča o velikih zvereh

Poleg teoretičnega znanja je za oblikovanje stališč pomembna tudi neposredna izkušnja. Ta lahko deluje kot sprožitelj oblikovanja pozitivnih stališč do živali (Tomažič, 2011). V primeru izobraževanj o velikih zvereh je vpeljava neposredne izkušnje zelo otežena, saj so srečanja z omenjenimi vrstami v naravi redka. Eden izmed načinov je uporaba bioloških materialov (npr. kožuha, lobanj, odlitkov stopinj), preko katerih je posameznikom omogočena posredna izkušnja z velikimi zvermi (Hummel in Randler, 2010; glej Oražem in sod., 2019; Tunniclife in Reiss, 1999). Posredna izkušnja lahko

zajema obisk habitata velikih zveri in pri tem opazovanje znakov prisotnosti. Kot neposredno izkušnjo pa lahko ponudimo opazovanje predstavnikov zveri, npr. v živalskem vrtu, kar lahko prav tako spodbudi oblikovanje pozitivnih stališč pri posamezniku (Prokop in sod., 2009).

V raziskavi stališč do medvedov in znanja o njih (glej Oražem in sod., 2021) se je dejavnik srečanja (opazovanja) z medvedom v naravi izkazal kot ključen dejavnik za zmanjšanje strahu, kar smo opazili tudi pri raziskavi na temo volkov. Zanimiv in ne povsem pojasnjen pa ostaja izsledek, da se je med učenci in dijaki pri pogostejšem obisku živalskega vrta pojavil nekoliko večji strah pred medvedi. Rezultati nadalje kažejo, da je opazovanje medveda v naravi povezano z nekoliko večjim poznavanjem vrste, opazovanje medveda v živalskem vrtu pa z višjim interesom za učenje o vrsti. Kljub temu je treba to povezavo nadalje raziskati. Ker rezultati, skladno s preteklimi študijami (Braun in sod., 2018; Consorte-McCrea in sod., 2016; glej Oražem in sod., 2019), kažejo na pomembno povezavo med neposredno izkušnjo in zmanjšanjem strahu ter večjo tendenco za varstvo vrste, je priporočljivo, da prihodnje izobraževalne aktivnosti vključujejo tudi ta vidik. Ključno je, da se prihodnje študije osredotočijo tudi na primerjavo različnih tipov neposredne in posredne izkušnje v povezavi z znanjem in stališči.

3.1.5 Vpliv območja bivanja na znanje in stališča o velikih zvereh

Skladno s predhodno omenjenim pomenom neposredne izkušnje z živalmi rezultati raziskave med gimnazijci in veterinarskimi tehniki (glej Oražem in sod., 2019) kažejo, da dijaki, ki živijo na območju stalne prisotnosti volkov, izkazujejo višji interes za učenje in bolj naklonjena stališča do vrste, saj opazovanje volka v naravi sovpada z nižjim strahom posameznika. Ravno dijaki, ki živijo na območju stalne prisotnosti vrste, so izrazili najbolj pozitivna stališča. Med dijaki srednjega strokovnega izobraževanja (glej Oražem in sod., 2018) pa razlik med bivanjem na območju volkov ali izven njega nismo našli. Izjema je bila nekoliko večja podpora lovu med prebivalci območja s prisotnostjo volka, kar lahko pojasnimo z močno prisotno tradicijo lova na ruralnih območjih (Krange in Skogen, 2007; Skogen, 2001). Izsledki obeh raziskav so v nasprotju s splošno uveljavljenim mnenjem (Bjerke in sod., 1998; Consorte-McCrea in sod., 2016; Ericsson in Heberlein, 2003; Eriksson in sod., 2015; Karlsson in Sjöström, 2007; Kellert, 1996; Treves in sod., 2013; Williams in sod., 2002), saj naj bi bili ruralni prebivalci, predvsem zaradi škod, povzročenih na človekovem premoženju, manj naklonjeni vrsti. Izsledki študije so tako pomembna iztočnica v luči varstva vrste za prihodnje načrtovanje učnih programov, ki zajemajo mlajše prebivalce podeželja, in s tem priložnost za dolgoročno oblikovanje pozitivnega mnenja o vrsti. Čeprav so druge študije potrdile povezavo med

krajem bivanja in stališči učencev do medveda (Büssing in sod., 2019; Kaczensky, 2000), pa pri raziskovanju stališč slovenskih učencev do medvedov in znanja o njih (glej Oražem in sod., 2021) povezave med bivanjem na območju prisotnosti medveda in zunaj njega ter med stališči do vrste nismo zaznali. Našli pa smo povezavo med krajem bivanja in znanjem učencev v enem izmed podvzorcev, kjer so učenci, ki prihajajo z območja medveda, kljub izvedenim delavnicam posedovali večje znanje kot učenci, ki živijo v predmestju ali mestu. Da bi natančneje razumeli in potrdili povezavo območja bivanja s količino znanja, je treba izvesti dodatne raziskave z uporabo testov pred izvedeno delavnico in po njej na istih učencih, ne le posredno.

Ker kraj bivanja ni pomembno vplival na stališča do velikih zveri in znanje o njih, je bila primerjalna študija, v sklopu katere je bil uporabljen tudi naš vprašalnik za evalvacijo znanja in stališč (uporabljen v Oražem in Tomažič, 2018; Oražem in sod., 2019), izvedena na območju Nemčije. Avtorji (Randler in sod., 2020) so v nasprotju z našima raziskavama našli povezavo med krajem bivanja in stališči, kar bi lahko pojasnili z dolgo odsotnostjo volkov in aktualnim ponovnim naseljevanjem Nemčije. V Sloveniji, kjer volk ni bil nikoli povsem iztrebljen, se je toleranca do te vrste ohranila v večji meri. Consorte-McCrea in sod. (2016) so izpostavili, da lahko neposredna izkušnja z zvermi (v njihovem primeru opazovanje v živalskem vrtu) pozitivno vpliva na spremembo stališča posameznika, tudi če so njegove pretekle izkušnje negativne. Poleg tega so Bjerke in sod. (1998) izpostavili pozitivno povezavo med izobraževanjem in stališči prebivalcev območja prisotnosti volka, kar nudi dodatno priložnost za delo z mlajšimi generacijami interesnih skupin, pri katerih se konflikt z zvermi pogosteje pojavlja.

3.1.6 Prisotnost lovca in reja pašnih živali v domačem okolju ter njun vpliv na znanje in stališča o velikih zvereh

V primerjavi z drugimi dejavniki sta imela prisotnost lovca ali reja pašnih živali manjši vpliv na stališča gimnazijcev in veterinarskih tehnikov (glej Oražem in sod., 2019). Dijaki, ki imajo lovca v družinskem krogu, so izkazali nekoliko večji interes za učenje o volkovih. Čeprav so sama stališča lovcev do volkov kontradiktorna, pa nekatere študije poročajo o bolj pozitivnih stališčih te interesne skupine v primerjavi s splošno javnostjo (Williams in sod., 2002). Podobno lahko sklepamo tudi na podlagi naših rezultatov, saj lahko lovci spodbudijo interes za učenje o volkovih med mlajšimi v družinskem krogu le, če imajo tudi sami naklonjena stališča do te vrste. V vzorcu dijakov srednješolskega strokovnega izobraževanja (glej Oražem in Tomažič, 2018) večjega interesa za učenje nismo zaznali, so pa rezultati pokazali manjši strah pred volkovi med dijaki, ki so poročali o prisotnosti lovca v družinskem krogu. Pri stališčih do medvedov (glej Oražem in sod., 2021) smo zaznali ravno nasproten trend. Pri učencih in dijakih, pri katerih je v družinskem krogu prisotno lovstvo, so izrazili nekoliko manj podpore vrsti. Nasprotno,

povezave med stališči dijakov in rejo pašnih živali v družini nismo zaznali (glej Oražem in sod., 2019), kar je v nasprotju s splošno uveljavljenim mnenjem in kaže, da je reja živali predvsem interes staršev in ne dijakov samih.

Lovstvo in reja pašnih živali v družini nista imela vpliva na količino znanja o volkovih pri dijakih ne glede na program izobraževanja (glej Oražem in Tomažič, 2018; Oražem in sod., 2019). Nasprotno se je izkazalo za stališča do medvedov (glej Oražem in sod., 2021), kjer se je pojavil trend nekoliko večjega znanja o vrsti pri učencih in dijakih, ki so poročali o prisotnosti lovca ali reje pašnih živali v družinskem krogu.

Ker je bila prisotnost omenjenih interesov v družinskih krogih dijakov zastopana v majhnem delu vzorcev vseh treh raziskav, so potrebne nadaljnje, ciljno usmerjene študije, da bi bolje razumeli povezavo s stališči do volkov in medvedov in znanjem o njih med učenci in dijaki. V presečnih raziskavah smo izvedli posnetek stanja v določenem časovnem obdobju, za celovitejše razumevanje pa je smiselno izvesti longitudinalno študijo, izvedba katere je pogojena z bistveno daljšim časovnim obdobjem. Kljub temu pa izsledki raziskav nakazujejo na pomembnost dela predvsem z mlajšimi generacijami rejcev, saj njihova stališča niso odklonilna.

3.1.7 Drugi dejavniki vpliva na znanje in stališča do velikih zveri

Izsledki raziskave stališč do medvedov in znanja o njih (glej Oražem in sod., 2021) kažejo na pomembnost posedovanja hišnih ljubljenčkov, v našem primeru psov, v povezavi z večjim znanjem o medvedih. Ker pa je bil ta del vzorca majhen in v drugem podvzorcu tega trenda nismo potrdili, so za boljše razumevanje omenjene povezave potrebne nadaljnje ciljne študije na reprezentativnejšem vzorcu, kjer bo zajetih več ljudi, ki imajo hišne ljubljenčke.

3.2 SKLEPI

Aktivnosti, ki temeljijo na ohranjanju, varstvu in upravljanju z velikimi zvermi, imajo cilj bolje izobraziti širšo javnost ali posamezne ciljne skupine z namenom boljšega sprejemanja teh vrst in lažjega sobivanja z njimi. Dokler ne vemo, v kolikšni meri izobraževanje vpliva na stališča in s tem na vedenje posameznika, je težko predvideti smiselne aktivnosti. Namen te raziskave je bil oceniti vpliv izobraževanja na stališča v povezavi z drugimi dejavniki in tako pripraviti teoretično ozadje, ki bo uporabno pri načrtovanju izobraževalnih aktivnosti v varstvenih in upravljavskih akcijah.

Na podlagi pridobljenih rezultatov lahko na zastavljena raziskovalna vprašanja podamo sledeče odgovore:

1) **Kakšna so stališča obiskovalcev živalskega vrta o velikih zvereh in koliko znanja imajo o njih?**

   Rezultati stališč do vseh treh vrst velikih zveri in znanja o njih med obiskovalci živalskega vrta kažejo, da znanje in raven izobrazbe v največji meri vplivata na prepričanja, ki bodisi podpirajo bodisi nasprotujejo varstvu teh vrst. Pomemben vpliv na oblikovanje prepričanj je imel tudi spol. Vse druge neodvisne spremenljivke niso imele pomembnega vpliva na prepričanja obiskovalcev. Ker obiskovalci živalskega vrta v splošnem podpirajo ohranjanje živalskih vrst, so morda njihova stališča manj raznolika kot med splošno javnostjo, kar lahko opredelimo kot možno omejitev študije za ekstrapolacijo rezultatov v širši uporabi. Kot najpomembnejši dejavnik vpliva se je izkazalo znanje, ki je bilo povezano tako s podpiranjem kot z nasprotovanjem ohranjanju velikih zveri. Rezultati kažejo, da znanje vpliva na oblikovanje ugodnih naravovarstvenih prepričanj za vse tri vrste velikih zveri. Za ohranjanje in upravljanje z velikimi zvermi je še pomembnejše spoznanje, da višja raven znanja vpliva na omilitev nasprotujočih prepričanj do varstva teh vrst. Rezultati tega dela so primerljivi s predhodno omenjenimi deli raziskave in kažejo, da ima poučevanje o bioloških dejstvih, preko odpravljanja napačnih predstav, potencial za izboljšanje splošne javne podpore ohranjanju velikih zveri. V primerjavi z znanjem vpliv spola ni bil tako enoten. Rezultati kažejo, da ima spol večji vpliv na nasprotujoča prepričanja kot pa na prepričanja, ki podpirajo varstvo velikih zveri. Ženske so v splošnem bolj nasprotovale varstvu velikih zveri. Vpliv spola je tako povezan z nasprotujočimi prepričanji do vseh treh vrst, pri prepričanjih, ki podpirajo varstvo, pa najdemo povezavo le pri risu. Vpliv spola se je pokazal tudi v povezavi s količino znanja. V primerjavi z ženskami so moški izkazali več znanja o vseh treh vrstah. Na splošno so rezultati tega dela študije primerljivi z delom o medvedih in kažejo, da je smiselno prilagoditi izobraževalne aktivnosti glede na spol v

povezavi s posamezno vrsto velike zveri. Ker razlik med prepričanji do posamezne vrste praktično ni bilo, lahko sklepamo, da je smiselno prilagoditi izobraževanje v živalskih vrtovih (in drugih relevantnih neformalnih učnih ustanovah) glede na spol in raven izobrazbe obiskovalcev. Kljub temu da je slednja vplivala na prepričanja obiskovalcev, na količino znanja anketirancev ni imela pomembnega vpliva. Če torej količina znanja ni v korelaciji s stopnjo izobrazbe, potem izobraževanje v formalnih institucijah tematike ne obravnava dovolj učinkovito. Kot je bilo že predlagano za osnovnošolske učitelje, bi morali tudi pedagoški delavci na višjih stopnjah več pozornosti nameniti vključevanju učencev, dijakov ali študentov v dejavnosti, ki spodbujajo in nudijo tesen stik z živimi organizmi. Tu se ponovno odraža velik potencial izobraževanja v živalskem vrtu in drugih sorodnih neformalnih učnih okoljih, ki dopolnjujejo usvajanje znanja v formalnih učnih okoljih.

2) **Kakšna so stališča dijakov različnih smeri strokovnega izobraževanja (veterinarski tehnik, kmetijsko-podjetniški tehnik in naravovarstveni tehnik) do volkov in kakšno znanje imajo o njih?**

Pregled stališč dijakov srednješolskih strokovnih programov kaže, da imajo srednješolci v splošnem pozitivna stališča do volkov, vendar je njihovo znanje o vrsti pomanjkljivo. Pri temah, povezanih s strahom, kot sta strah pred poškodbami in plenjenje domačih živali, so dijaki izkazali nevtralna stališča. Povprečje odgovorov kaže tudi na nevtralno stališče glede interesa za učenje, kar kaže na manj interesa za učenje o tej vrsti. Raziskovanje znanja je prineslo nekaj pomembnih rezultatov. Največ znanja so izkazali dijaki programa veterinarski tehnik, najmanj pa dijaki programa kmetijsko-podjetniški tehnik. Smer izobraževanja se je izkazala kot pomemben dejavnik vpliva v povezavi z vsemi kategorijami stališč, tudi znanjem. Za slednje je bil izobraževalni program tudi edini dejavnik vpliva. Čeprav spol ni vplival na količino znanja, je bil zaznan vpliv le-tega na stališča dijakov. Dijakinje so izkazale bolj pozitivna stališča do volkov in večji interes za učenje o vrsti. Letnik izobraževanja je prav tako vplival na zanimanje za učenje. Z leti se je interes manjšal, tako so dijaki tretjega letnika posedovali najmanj interesa za učenje o volkovih. Tudi dejavnika prisotnost lovca v družini in območje bivanja sta vplivala na stališča anketirancev. Pri dijakih, ki so poročali o prisotnosti lovca v družinskem okolju, so izkazali manj strahu do volkov, prebivanje na podeželju pa je zmanjšalo nasprotovanje lovu. Na podlagi pridobljenih podatkov predlagamo, da bi morali srednješolski strokovni izobraževalni programi vključevati tudi teme o volku, saj bodo lahko dijaki pri svojem nadaljnjem poklicnem delu posredno ali neposredno vključeni v

upravljanje in ohranjanje vrst. Posebno pozornost je treba nameniti predvsem izobraževalnemu programu kmetijsko-podjetniški tehnik, katerega dijaki izkazujejo bolj negativna stališča in najmanj znanja. Priporočamo prenovitev ali nadgraditev izobraževalnega programa s temami o ekologiji in etologiji volkov, primernem obnašanju človeka in predvsem o praksah, ki spodbujajo reševanje in preprečevanje konfliktov.

3) Ali imajo organizirane delavnice na temo volkov različen učinek na znanje dijakov (gimnazijski program in program veterinarski tehnik) o volkovih in na stališča do njih?

Raziskovanje stališč do volkov in znanja o njih med gimnazijci v primerjavi z veterinarskimi tehniki je pokazalo, da so vsi tipi pouka doprinesli k večji količini znanja med dijaki. Največji vpliv je imela delavnica, izvedena v univerzitetnem okolju, kar kaže na pomembnost spremembe učnega okolja in izvedbe pouka izven šolskih prostorov. Poleg spremembe učnega okolja bi lahko na uspešnost delavnice vplivalo tudi večje zaupanje dijakov strokovnjaku s področja velikih zveri kot učitelju. Ker sta delavnice izvajali isti osebi, predstavlja ta predpostavka nepojasnjeno varianco in potrebuje nadaljnje primerjalne študije. V nasprotju z našimi pričakovanji pa stališča v vseh kategorijah dijakov niso postala bolj pozitivna v povezavi s poukom. Predlagamo, da naj prihodnje izobraževalne aktivnosti vključujejo tudi neposredne izkušnje z volkovi (npr. opazovanje v živalskem vrtu), saj lahko izkušnja vzbudi pozitivna čustva med dijaki in s tem zanimanje za učenje. Največjo spremembo stališča v povezavi s poukom smo zabeležili na univerzitetni delavnici. Rezultati kažejo, da sta znanje in izobraževalni program dejavnika, ki najpomembneje vplivata na stališča dijakov. V nasprotju s splošnim mnenjem so dijaki programa veterinarski tehnik posedovali več znanja o volkovih in izražali bolj pozitivna stališča kot gimnazijci. Ni pa gotovo, ali je to posledica izobraževanja v različnih programih ali znanja učencev in njihovih interesov za vpis v srednje strokovno ali splošno srednješolsko izobraževanje. Drugi dejavniki vpliva, kot so spol, prisotnost lovstva in reje pašnih živali v družini ali neposredna izkušnja z volkom v naravi, nimajo tako izrazitega vpliva na stališča dijakov. Spol (ženski) in prisotnost lovca v družini sta bila povezana z več zanimanja za učenje. Opazovanje volka v naravi je bilo povezano z manj izraženega strahu in posledično višjim sprejemanjem vrste. Reja pašnih živali je bil edini dejavnik, ki ni vplival na stališča dijakov, vendar je treba opozoriti, da ti rezultati temeljijo le na delu vzorca. V prihodnjih raziskavah je potreben večji vzorec za raziskovanje učinka tega dejavnika. Pričujoča študija poudarja pomen znanja učencev in njihovega izobrazbenega ozadja v zvezi z ohranjanjem volkov. Pri načrtovanju izobraževalnih aktivnosti je

tako pomembno upoštevati tudi razlike med spoloma, vpliv lovcev na interes za učenje in neposredno izkušnjo (opazovanje) volkov za ublažitev strahu pri dijakih. Predlagamo, da se prihodnje raziskave osredotočajo tudi na stališča dijakov v povezavi z rejo pašnih živali. Ključni izsledek tega dela raziskave pa je v luči varstva volkov večja učinkovitost v učenca ali dijaka usmerjenega načina poučevanja. Tudi za izobraževanje splošne javnosti se predpostavlja ta način kot učinkovitejši v primerjavi s klasičnim, v učitelja ali predavatelja usmerjenim pristopom.

4) Kakšna so stališča učencev do rjavega medveda in koliko znanja imajo o njem ter kakšen je posreden vpliv organiziranih delavnic na njihova stališča in znanje?

V povezavi z raziskovanjem stališč do medvedov in znanja o njih izpostavljamo več ugotovitev. Socialnodemografska dejavnika, spol in opazovanje oziroma srečanje medveda v naravi, sta pomembno vplivala tako na stališča kot tudi na znanje učencev in dijakov. Oba dejavnika je smiselno upoštevati pri načrtovanju prihodnjih izobraževalnih in komunikacijskih dejavnosti. Drugi dejavniki, kot so območje bivanja, lastništvo psa, prisotnost lovstva in reje pašnih živali v družinskem okolju ter obiskovanje živalskega vrta, so imeli manjši vpliv na stališča in znanje učencev in dijakov na splošno, kar pomeni, da jih je treba dodatno raziskati. Rezultati kažejo tudi povezavo med znanjem in stopnjo izobraževanja učencev oziroma dijakov. Potrdili smo domnevo, da znanje vpliva na stališča učencev in dijakov do medvedov. Znanje se je tako izkazalo kot pomemben dejavnik vpliva v povezavi z vsemi kategorijami stališč: zanimanjem za učenje, ohranjanjem in strahom. Nadalje je bil zaznan pomemben vpliv pouka (delavnic) v povezavi z znanjem, ne pa tudi s spremembo stališč učencev in dijakov. Čeprav je pričujoča študija posredno raziskala vpliv poučevanja, bi bilo treba podobno študijo izvesti na ekvivalentnih vzorcih (testiranje istih učencev in dijakov pred izvedeno delavnico in po njej), da bi neposredno raziskali vpliv pouka. Kljub temu rezultati študije kažejo, da je več znanja v korelaciji z močnejšo naravnanostjo za ohranjanje vrste in deloma z manj strahu. Kljub temu da na tovrstnih delavnicah učenci pridobijo pomembna nova znanja, je treba opozoriti, da so poleg pridobivanja znanja ključna tudi naklonjena stališča. Smiselno je, da prihodnje aktivnosti za namene ohranjanja in upravljanja z velikimi zvermi vključujejo tudi izobraževalne dejavnosti, ki vsebujejo neposredno izkušnjo z opazovanjem živih živali (v naravi ali v živalskem vrtu oziroma drugi primerni ustanovi) ali posredno izkušnjo preko spremljanja njihove prisotnosti v naravnih habitatih. Poleg tega ne smemo zanemariti pomena družbenoznanstvenih tem s

področja velikih zveri pri načrtovanju pedagoških aktivnosti. Za nadaljnje delo je ključno sprotno znanstveno evalviranje učinkovitosti izobraževalnih aktivnosti z namenom čimprejšnje aplikacije v prakso na področju velikih zveri.

4 POVZETEK

4.1 POVZETEK

Čeprav velike zveri ogrožajo različni dejavniki, je sprejemanje vrst v javnosti osrednjega pomena. Poznavanje stališč in znanja o velikih zvereh je ključno za uspešnost njihovega ohranjanja in upravljanja. Kot krovne in ambasadorske vrste velike zveri vplivajo tudi na varovanje narave v širšem pomenu. Zato je bilo izobraževanje, kot sredstvo za dosego boljšega poznavanja vrst in oblikovanja stališč, naklonjenih ohranjanju, prepoznano kot pomemben cilj varstvene biologije. Skladno z namenom prispevanja k doseganju tega cilja je bil zastavljen tudi osrednji cilj naše raziskave. Ovrednotiti smo želeli znanje o velikih zvereh in stališča do njih med ciljno širšo javnostjo (med obiskovalci Živalskega vrta Ljubljana), učenci osnovnih šol in dijaki srednjih šol ter analizirati, kateri dejavniki vplivajo na oblikovanje stališč in količino znanja. Pretekle raziskave so se osredotočale predvsem na analize stanja, zato smo želeli zapolniti vrzel v dosedanjem znanju o načinih oblikovanja in spreminjanja stališč ter znanja in se osredotočili na vpliv izobraževanja. Raziskali smo izbrane učne pristope in ovrednotili njihovo učinkovitost pri doseganju tega cilja.

Preko različnih vprašalnikov smo v obliki samoporočil pridobili informacije o stališčih do velikih zveri, preko preizkusov znanja pa smo ovrednotili vpliv znanja na stališča 2218 sodelujočih anketirancev. V analizo so bili vključeni podatki, ki smo jih sistematično zbirali znotraj 12-letnega obdobja (med letoma 2009 in 2021). V raziskavi smo se osredotočili na štiri obširnejša raziskovalna vprašanja, in sicer:

1) Kakšna so stališča obiskovalcev živalskega vrta do velikih zveri in koliko znanja imajo o njih?
2) Kakšna so stališča dijakov različnih smeri strokovnega izobraževanja (veterinarski tehnik, kmetijsko-podjetniški tehnik in naravovarstveni tehnik) do volkov in koliko znanja imajo o njih?
3) Ali imajo organizirane delavnice na temo volkov različen učinek na znanje dijakov (gimnazijski program in program veterinarski tehnik) o volkovih in stališča do njih?
4) Kakšna so stališča učencev do rjavega medveda in koliko znanja imajo o njem ter kakšen je posreden vpliv organiziranih delavnic na njihova stališča in znanje?

Ovrednotenje stališč do velikih zveri in znanja o njih med ciljno širšo javnostjo – obiskovalci živalskega vrta – kaže, da znanje in raven izobrazbe v največji meri vplivata na prepričanja o velikih zvereh. Količina znanja je bila povezana tako s prepričanji, ki podpirajo ohranjanje, kot s tistimi, ki ohranjanju nasprotujejo. Višja stopnja izobrazbe sodelujočih se je izkazala kot dejavnik omilitve ohranjanju nasprotujočih prepričanj. Poleg znanja in stopnje izobrazbe se je kot pomemben dejavnik vpliva izkazal tudi spol.

Čeprav so ženske v splošnem bolj nasprotovale varstvu velikih zveri, se vpliv spola kaže predvsem v povezavi z nasprotujočimi prepričanji. Le v primeru risa je spol vplival tudi na prepričanja v prid ohranjanju. Spol ni vplival le na stališča sodelujočih, temveč tudi na količino njihovega znanja, pri čemer so moški izkazali več znanja o vseh treh vrstah.

V primeru dijakov srednjega strokovnega izobraževanja (veterinarski, naravovarstveni in kmetijsko-podjetniški tehnik) smo zaznali v splošnem pozitivna stališča do volkov, vendar pomanjkljivo znanje o njih. Največ znanja smo zaznali pri dijakih programa veterinarski, najmanj pa pri dijakih programa kmetijsko-podjetniški tehnik. Smer izobraževanja se je izkazala kot pomemben dejavnik vpliva tako na stališča kot tudi na znanje. Spol ni vplival na količino znanja, bil je povezan s stališči dijakov. Dijakinje so izkazale bolj pozitivna stališča do volkov in večji interes za učenje o vrsti. Poleg omenjenih dejavnikov vpliva smo zaznali tudi vpliv letnika izobraževanja na zanimanje za učenje, manj strahu pri dijakih, ki imajo v družini lovca, ter manjše nasprotovanje lovu med dijaki, ki prihajajo iz družin rejcev.

Pri raziskovanju vpliva različnih učnih metod na stališča in znanje gimnazijcev in dijakov programa veterinarski tehnik smo zaznali doprinos vseh načinov izobraževanja. Kljub temu se vse kategorije stališč niso spremenile v bolj pozitivne v povezavi s poukom. Največji vpliv je imela delavnica, izvedena izven ustaljenega šolskega okolja (na univerzi), pri kateri smo zabeležili največjo spremembo stališč. Med drugimi dejavniki vpliva sta bila spol (ženski) in prisotnost lovca v družini povezana z več zanimanja za učenje, opazovanje volka v naravi pa z manj izraženega strahu in posledično višjim sprejemanjem vrste. Reja pašnih živali je bil edini dejavnik, ki v tem delu raziskave ni vplival na stališča dijakov.

V povezavi z raziskovanjem stališč do medvedov in znanja o njih sta se kot pomembna dejavnika izkazala spol in opazovanje oziroma srečanje medveda v naravi. Njun vpliv je bil zaznan tako pri izražanju stališč kot tudi pri količini znanja. Na znanje je vplivala tudi stopnja izobraževanja. Znanje se je tako izkazalo kot zelo pomemben dejavnik vpliva na oblikovanje stališč do medvedov. Nadalje je bil v povezavi s količino znanja zaznan pomemben vpliv pouka, ne pa tudi s splošno pozitivno spremembo stališč učencev in dijakov. Rezultati kažejo, da je več znanja pozitivno vplivalo na stališča, ki podpirajo ohranjanje vrste, deloma pa znižajo strah pri učencih in dijakih.

Rezultati, pridobljeni med raziskavo, predstavljajo pomemben aplikativni vidik za načrtovanje prihodnjih aktivnosti za ohranitev in upravljanje z velikimi zvermi.

4.2 SUMMARY

Although large carnivores are threatened by a variety of factors, public acceptance of species is of crucial importance. Researching the attitudes and knowledge of large carnivores is key to successful conservation and management actions. As umbrella and ambassadorial species, large carnivores represent nature conservation in a broader sense. Therefore, education, as a prerequisite to achieving a higher knowledge of species and more pro-conservation attitudes in public, has been recognized as an important long-term goal of conservation biology. In line with the purpose of contributing to the achievement of this goal, the main goal of our research has been set accordingly. In the doctoral dissertation, we aimed to evaluate knowledge about and attitudes toward large carnivores among the target general public (visitors to the Ljubljana Zoo), lower and upper secondary school students, and finally, to analyze which factors influence the formation of attitudes and knowledge. Until now, the majority of the research focused mainly on the analysis of the situation. Consequently, we wanted to fill the gap in the current knowledge on approaches that influence attitude and knowledge formation and change. Therefore, we focused on the impact of education. We explored several learning approaches and evaluated their effectiveness concerning the aforementioned goal achievement.

Through various questionnaires in the form of self-report scales, we obtained information on attitudes towards large carnivores, and through knowledge tests, we evaluated the impact of knowledge on the attitudes. In the research, 2218 participating respondents were included in total. The analysis included data that were systematically collected within a 12-year period (from 2009 to 2021). In our research, we focused on four broader research questions:

1) What are the attitudes and how much knowledge do zoo visitors have about large carnivores?
2) What are the attitudes and how much knowledge do students of different vocational upper secondary school programs have of wolves?
3) Do organized workshops about wolves have a different effect on students' knowledge about and attitudes toward wolves (general upper secondary school program and veterinary technician program)?
4) What are the attitudes and how much knowledge do students have about brown bears and what is the indirect impact of the organized workshops on their attitudes and knowledge?

The evaluation of attitudes towards and knowledge among the target general public - visitors of the Ljubljana Zoo shows that knowledge and level of education have the greatest influence on conservation beliefs regarding large carnivores. The amount of knowledge was related to both beliefs that support conservation and those that oppose

conservation. The higher level of education of the participants proved to be a mitigating factor in maintaining opposing beliefs. In addition to knowledge and level of education, gender has also proved to be an important influencing factor. Although women, in general, oppose more to the conservation of large carnivores, the influence of gender is manifested primarily in connection with opposing beliefs. Only in the case of lynx, gender also influence supporting beliefs. Furthermore, gender influenced not only the attitudes of the participants but also the amount of their knowledge, with men demonstrating more knowledge about all three species.

In the case of vocational upper secondary school students (veterinary, nature conservation and agricultural technicians), we found generally positive attitudes towards wolves, but a lack of knowledge about the species. We found the most knowledge among the students of veterinary technician rogram, and the least among the students of agricultural technician program. The type of education has proven to be an important factor influencing both attitudes and knowledge. Gender did not affect the amount of knowledge, but it was related to students' attitudes. The female students showed a more positive attitude towards wolves and a greater interest in learning about the species. In addition to the aforementioned influencing factors, we also noticed the influence of the study year in regards to the learning interest. Additionally, less fear among students who have a hunter in the family and less opposition to hunting among students coming from livestock breeding families were recognised.

In researching the impact of different teaching methods on the attitudes and knowledge of general high school and veterinary technician students, we detected the contribution of all types of instruction delivery. Nevertheless, not all categories of attitudes have changed to more positive in relation to teaching. The biggest impact had the workshop conducted in the out-of-school environment (at the university), where we recorded the largest change in attitudes. Other influencing factors, including gender (female) and the presence of a hunter in the family, were associated with more interest in learning. Seeing a wolf in nature correlated with less pronounced fear and, consequently, higher acceptance of the species. In this part of the research, livestock breeding was the only considering factor, for which we did not find any correlation with students' attitudes.

In connection with the research of attitudes towards and knowledge about bears, gender and seeing a bear in nature proved to be important factors of influence. Their influence was perceived both in the expression of attitudes as well as in knowledge. Additionally, the level of education also influenced knowledge. Knowledge has thus proven to be a very important factor influencing the formation of attitudes towards bears. Furthermore, in relation to the amount of knowledge, a significant impact of instructions was also found. Surprisingly, a generally positive change in the attitudes regarding the instructions was not detected. Since it lowers the fear, the results show that a higher amount of

knowledge has a positive effect on attitudes that support species conservation.

The results obtained during the research represent an important application aspect for planning future activities regarding the conservation and management of large carnivores.

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ZAHVALA

Največja zahvala gre mentorju, doc. dr. Iztoku Tomažiču, ki me je skozi celotno obdobje študija usmerjal, takoj priskočil na pomoč ob vseh statističnih in vsebinskih zagatah, podpiral vse moje dodatne ideje in bil vedno na voljo, tudi izven delavnika.

Zahvaljujem se članom komisije za pregled dela in vse konstruktivne komentarje, ki so prispevali k izboljšanju dela in predstavitve rezultatov.

Prof. dr. Christophu Randlerju z Univerze v Tübingenu (Nemčija) za nasvete pri statistični analizi podatkov in sodelovanju pri pripravi izvirnega znanstvenega članka na temo izobraževalnih delavnic o volkovih.

Staršema, ki sta me skozi celoten proces šolanja finančno, predvsem pa čustveno podpirala. Mami za ves časovni vložek pri usklajevanju družinskih opravil.

Možu Danielu, ki me je vzpodbujal in verjel, da sem lahko mama in raziskovalka hkrati.

Sodelavcem in prijateljem za vse vzpodbudne misli.

Tini Levec za lekturo znanstvenih člankov. Poloni Bartol za lekturo disertacije.

Vsem šolam in ZOO Ljubljana, ki so omogočili izvedbo izobraževalnih aktivnosti in anketiranja.

Šolnino za 3. letnik je financiralo Ministrstvo za znanost, šolstvo in šport, program »generacija 2016«.

Objavi dveh izvirnih znanstvenih člankov v odprtem dostopu sta bili sofinancirani s strani Javne agencije za raziskovalno dejavnost Republike Slovenije (ARRS) v okviru projekta N1-0105 in sklada Open Access Publishing Fund Univerze v Tübingenu.

Delo posvečam vama, Oskar in Liza, ki me neprestano opominjata, da sta radovednost in vztrajnost ključni.

Vesna Mihelič Oražem

PRILOGE

Priloga A: Vprašalnik o volkovih, uporabljen za pridobivanje podatkov v sklopu člankov The vocational upper secondary schools students' knowledge and their attitudes toward wolves in Wolves' conservation through educational workshops

ANKETNI VPRAŠALNIK: POZNAVANJE BIOLOGIJE VOLKA IN STALIŠČA DO VOLKA

Ime in priimek (ali številka v redovalnici) _____ **Datum:** _____

Spol: [ ] moški, [ ] ženski **Starost:** [ ] let

Letnik: [ ]; **Smer:** [ ]

Ocena biologije v preteklem šolskem letu: 1 2 3 4 5

Živim: [ ] v mestu [ ] v predmestju [ ] na podeželju

V naravo hodim: [ ] Enkrat dnevno, [ ] Enkrat tedensko, [ ] Enkrat na mesec, [ ] Le izjemoma

Občina stalnega bivališča: _____

V družini imamo lovca/e:	DA	NE
Doma redimo drobnico (ovce, koze):	DA	NE
Biologija je predmet, ki se ga pretežno učim na pamet:	DA	NE
V naravi sem že srečal volka:	DA	NE
Z volkom sem se srečal v živalskem vrtu:	DA	NE

Dragi dijak/ dijakinja, pred teboj je vprašalnik, s katerim želimo ugotoviti, kakšna so tvoja stališča do volkov. Podatki o anketirancu so tajni. Rešitve ne vplivajo na oceno pri predmetu.

V nadaljevanju obkroži, v kolikšni meri se strinjaš s posamezno trditvijo.
Vrednosti: **1**= se nikakor ne strinjam; **2**= se ne strinjam; **3**= nimam posebnega mnenja; **4**= se strinjam; **5**= se popolnoma strinjam

	STALIŠČA	OCENA
1	Rad bi spoznaval življenjska okolja volka.	1 2 3 4 5
2	Volkov se bojim.	1 2 3 4 5
3	Volka v Sloveniji ni potrebno ohraniti, saj živi drugod po Evropi.	1 2 3 4 5
4	Zadrževanje volkov v ujetništvu je kruto.	1 2 3 4 5
5	Motilo bi me, če bi odstrelili vse volkove v Sloveniji.	1 2 3 4 5
6	Strah bi me bilo hoditi po gozdu, če bi vedel, da tam živijo volkovi.	1 2 3 4 5
7	Pobijanje volkov za zabavo je kruto.	1 2 3 4 5
8	Rad bi izvedel, kako so se volkovi razvili.	1 2 3 4 5
9	Raje bi si ogledal model volka kot živo žival.	1 2 3 4 5
10	Volkove bi bilo najbolje iztrebiti (pobiti).	1 2 3 4 5
11	Rad berem različne stvari o volkovih.	1 2 3 4 5
12	Taboril bi le tam, kjer daleč naokoli ne ni bilo nobenega volka.	1 2 3 4 5
13	Volka je v Sloveniji pomembno ohraniti za prihodnje generacije.	1 2 3 4 5
14	Tudi volkovi morajo imeti pravice.	1 2 3 4 5
15	Prisotnost volka v gozdovih v svoji okolici bi sprejel brez večjih težav.	1 2 3 4 5
16	Rad gledam poljudno-znanstvene oddaje o volkovih.	1 2 3 4 5
17	Volkovi so po naravi zlobni, saj napadajo domače živali (npr. ovce).	1 2 3 4 5
18	Prepovedal bi kakršenkoli lov na divje živali.	1 2 3 4 5
19	Volkovi ne sodijo v bližino človeških bivališč.	1 2 3 4 5
20	Volk človeku ni nevaren.	1 2 3 4 5
21	Število volkov v Sloveniji bi se moralo povečati.	1 2 3 4 5

ANKETNI VPRAŠALNIK: POZNAVANJE BIOLOGIJE VOLKA IN STALIŠČA DO VOLKA

Dragi dijak / dijakinja, pred teboj je vprašalnik, s katerim želimo ugotoviti, kakšno je tvoje poznavanje biologije volka. Podatki o anketirancu so tajni. Rešitve ne vplivajo na oceno pri predmetu.

	ZNANJE	ODGOVOR
1	Volk je človeku nevaren.	DRŽI NE DRŽI NE VEM
2	Volkov ni treba streljati, da bi obvarovali ljudi.	DRŽI NE DRŽI NE VEM
3	Odstrel volkov ni učinkovita metoda za preprečevanje škode na drobnici.	DRŽI NE DRŽI NE VEM
4	Način uriniranja pri volku ni odvisen od spola (kot pri psih), temveč od socialnega položaja.	DRŽI NE DRŽI NE VEM
5	Volk v naravi pleni najbolj zdrave rastlinojedce.	DRŽI NE DRŽI NE VEM
6	V Sloveniji je volk tujerodna vrsta.	DRŽI NE DRŽI NE VEM
7	Volk živi samotarsko življenje.	DRŽI NE DRŽI NE VEM
8	Volk je v Sloveniji ogrožena vrsta.	DRŽI NE DRŽI NE VEM
9	Volk dnevno prehodi ali preteče okrog 7 km.	DRŽI NE DRŽI NE VEM
10	Človek lahko v naravi nadomesti ekološko vlogo volka.	DRŽI NE DRŽI NE VEM
11	Veliko volčjih mladičev pogine preden dopolnijo 1 leto.	DRŽI NE DRŽI NE VEM
12	Ker je število volkov v Sloveniji previsoko, napadajo domače živali.	DRŽI NE DRŽI NE VEM

ZNANJE: izbirni tip vprašanj

Pri vsakem vprašanju je pravilen le EN ODGOVOR. Če ne veste odgovora, obkrožite *»ne vem«*.

1. Volkove uvrščamo v družino:
   a) maček.
   b) psov.
   c) kun.
   d) ujed.
   e) Ne vem.

2. Kaj menite, koliko volkov živi v Sloveniji?
   a) 10-25.
   b) 26-40.
   c) 41-60.
   d) 80-120.
   e) Ne vem.

3. Povprečna telesna masa volka (samca) v Sloveniji je med:
   a) 10-30 kg.
   b) 30-40 kg.
   c) 40-50 kg.
   d) 50-70 kg.
   e) Ne vem.

ANKETNI VPRAŠALNIK: POZNAVANJE BIOLOGIJE VOLKA IN STALIŠČA DO VOLKA

4. Pri nas volkovom hrano v večini predstavlja:
   a) drobnica.
   b) mrhovina.
   c) srnjad in jelenjad.
   d) mali glodavci.
   e) Ne vem.

5. Volk lovi predvsem:
   a) zdrave rastlinojedce.
   b) oslabele rastlinojedce.
   c) zdrave mesojedce.
   d) oslabele mesojedce.
   e) Ne vem.

6. Volkovi večji del svojega življenja živijo:
   a) v paru.
   b) v tropu.
   c) samotarsko življenje.
   d) Ne vem.

7. Volkovi se parijo:
   a) pozimi.
   b) spomladi.
   c) poleti.
   d) jeseni.
   e) Ne vem.

8. Koliko mladičev imajo volkovi?
   a) 1-2.
   b) 3-5.
   c) 5-8.
   d) 8-12.
   e) Ne vem.

9. Obkrožite lobanjo, ki je značilna za zveri (ali , ki pripada zverem).

Slika 1 Slika2 Slika3

Po katerih znakih si se odločil za izbran odgovor:

_____

Priloga B: Vprašalnik o medvedih, uporabljen za pridobivanje podatkov v sklopu članka Students' attitudes to and knowledge of brown bears (Ursus arctos L.): can more knowledge reduce fear and assist in conservation efforts?

VPRAŠALNIK ODNOSU DO IN POZNAVANJU PROBLEMATIKE MEDVEDA

Spoštovani učenci / dijaki. Prosimo Vas, da se udeležite anonimne raziskave, s katero preverjamo odnos in poznavanje učencev o medvedih. Vaše sodelovanje bo pripomoglo k izboljšanju pedagoškega dela in bo vplivalo na razvoj ter izboljšanje naših naravovarstvenih aktivnosti.

Prosim, izrazite svoje strinjanje glede spodnjih trditev.

	ZNANJE: trditve	ODGOVOR		
1	Medvedi ovac ne ubijajo in se z njimi ne prehranjujejo.	DRŽI	NE DRŽI	NE VEM
2	Medved je v Sloveniji ogrožena vrsta.	DRŽI	NE DRŽI	NE VEM
3	Največji delež prehrane medveda predstavlja hrana živalskega izvora, kot je npr. srnjad.	DRŽI	NE DRŽI	NE VEM
4	S pomočjo analize dednega materiala v iztrebkih lahko določimo kateri medvedi so si v sorodu in koliko jih živi na nekem območju.	DRŽI	NE DRŽI	NE VEM
5	Naselitev medonosnih čebel v panjih lahko privablja medvede, kar lahko vodi v povzročanje škode.	DRŽI	NE DRŽI	NE VEM
6	S pomočjo analize dednega materiala iz ugrizov na drobnici ugotovimo, kateri medved je poškodoval ali ubil živali.	DRŽI	NE DRŽI	NE VEM
7	Medvedi lahko pri iskanju sadežev, npr. sliv, jabolk in češenj za prehrano, poškodujejo tudi sadna drevesa.	DRŽI	NE DRŽI	NE VEM
8	Medved je človeku nevaren.	DRŽI	NE DRŽI	NE VEM
9	Medvedi nikoli ne ubijejo živine in se z njo ne hranijo.	DRŽI	NE DRŽI	NE VEM
10	Medvedov ni potrebno streljati, da bi obvarovali ljudi.	DRŽI	NE DRŽI	NE VEM
11	Silažne bale medvedov ne privlačijo, čeprav imajo te lahko močen vonj.	DRŽI	NE DRŽI	NE VEM
12	Medved dnevno prehodi okrog 7 km.	DRŽI	NE DRŽI	NE VEM
13	Medvedi se hranijo s koruzo na koruznih poljih.	DRŽI	NE DRŽI	NE VEM
14	Odstrel medvedov ni učinkovita metoda za preprečevanje škode na drobnici.	DRŽI	NE DRŽI	NE VEM
15	Odpadki, ki se nahajajo v zabojnikih zunaj hiš, lahko privabljajo medvede.	DRŽI	NE DRŽI	NE VEM
16	Medved v naravi pleni najbolj zdrave rastlinojedce.	DRŽI	NE DRŽI	NE VEM
17	V Sloveniji je medved tujerodna vrsta.	DRŽI	NE DRŽI	NE VEM
18	Medvedi obiščejo območje z odpadki, do katerih imajo dostop, navadno le enkrat.	DRŽI	NE DRŽI	NE VEM
19	Medved živi samotarsko življenje.	DRŽI	NE DRŽI	NE VEM
20	Psi, čeprav dobro izučeni, ne morejo obvarovati živine pred medvedi.	DRŽI	NE DRŽI	NE VEM
21	Človek lahko v naravi nadomesti ekološko vlogo medveda.	DRŽI	NE DRŽI	NE VEM
22	Električne ograje so učinkovite pri odvračanju medvedov od čebeljih panjev.	DRŽI	NE DRŽI	NE VEM
23	Veliko medvedjih mladičev pogine preden dopolnijo 1 leto.	DRŽI	NE DRŽI	NE VEM
24	Če se živina nahaja na majhnem pašniku, jo lahko zaščitimo pred medvedi z električno ograjo.	DRŽI	NE DRŽI	NE VEM
25	Ker je število medvedov v Sloveniji previsoko, napadajo domače živali.	DRŽI	NE DRŽI	NE VEM
26	Dobro je, da zabojnike za smeti pripravimo za odvoz zjutraj, saj imajo tako medvedi manj časa za dostopanje.	DRŽI	NE DRŽI	NE VEM

Prosim, izrazite svoje prepričanje glede vseh spodnjih trditev.

Pomen lestvice:

1-se nikakor ne strinjam, **2**-se ne strinjam, **3**-neopredeljen, **4**-se strinjam, **5**-se popolnoma strinjam

	STALIŠČA	OCENA
S_01	Rad gledam poljudno-znanstvene oddaje o medvedih.	1 2 3 4 5
S_03	Medvedi imajo pravico živeti in koristiti gozdove, tako kot človek.	1 2 3 4 5
S_04_R	Medvedov se bojim.	1 2 3 4 5
S_05	Rad bi se učil tudi o vrstah medvedov, ki ne živijo v Sloveniji.	1 2 3 4 5
S_06_R	Ni potrebno, da je medved v Sloveniji zavarovan, saj jih dovolj živi drugod po Evropi.	1 2 3 4 5
S_09	Rad bi se učil o medvedih.	1 2 3 4 5
S_10	Medveda je v Sloveniji pomembno ohraniti za prihodnje generacije.	1 2 3 4 5
S_11	Prisotnost medveda v gozdovih v svoji okolici bi sprejel brez večjih težav.	1 2 3 4 5
S_15	Rad bi se učil o škodi, ki jo povzročajo medvedi in o konfliktih s človekom.	1 2 3 4 5
S_20_R	Menim, da v Sloveniji živi preveč medvedov.	1 2 3 4 5
S_21	Rad bi izvedel, kako se medvedi prehranjujejo, lovijo in prezimijo.	1 2 3 4 5
S_22	Motilo bi me, če bi odstrelili vse medvede v Sloveniji.	1 2 3 4 5
S_23_R	Strah bi me bilo hoditi po gozdu, če bi vedel, da tam živijo medvedi.	1 2 3 4 5
S_26_R	Medvede bi bilo najbolje iztrebiti (pobiti).	1 2 3 4 5
S_27_R	Raje bi si ogledal film o medvedu kot pa videl živo žival v naravi.	1 2 3 4 5

Za potrebe statistične obdelave podatkov, Vas prosimo, da izpolnite vse spodnje rubrike.

Spol: moški | ženski	**Starost:** _____
Razred || letnik: | 6 | 7 | 8 | 9 || 1 | 2 | 3 | 4 |	
Živim: □ v mestu | □ v predmestju | □ na podeželju	
V naravo hodim: • (Skoraj) vsak dan | • Enkrat tedensko | • Enkrat na mesec | • Le izjemoma	
Kolikokrat letno obiščete ZOO: • manj kot 1x letno | • 1 - 3x letno	
Kraj stalnega bivališča: _____	
V družini imamo lovca/e.	da | ne
Doma redimo drobnico (ovce, koze).	da | ne
V naravi sem že srečal medveda.	da | ne
Imel sem / imam psa kot hišnega ljubljenca.	da | ne

**** **Varstvo osebnih podatkov:** vsi pridobljeni osebni podatki bodo namenjeni izključno za anketno komuniciranje z Vami in za potrebe statistične obdelave podatkov. Avtor ankete se zavezuje, da bo morebitne osebne podatke, zbrane v okviru anketiranja, varoval v skladu z Zakonom o varstvu osebnih podatkov, ter da jih ne bo posredoval tretjim osebam.*

Priloga C: Vprašalnik o velikih zvereh, uporabljen za pridobivanje podatkov v sklopu članka Factors affecting zoo visitors' conservation beliefs and knowledge of large carnivores in 2009 and a dozen years later

VPRAŠALNIK O ODNOSU DO IN POZNAVANJU PROBLEMATIKE VELIKIH ZVERI

*Spoštovani obiskovalci ZOO Ljubljana. Prosimo Vas, da se udeležite **anonimne** raziskave, s katero preverjamo odnos obiskovalcev ZOO Ljubljana do velikih zvereh in njihovo poznavanje problematike velikih zveri. Vaše sodelovanje bo pripomoglo k izboljšanju pedagoškega dela in bo vplivalo na razvoj ter izboljšanje naših naravovarstvenih aktivnosti.*

I. Za potrebe statistične obdelave podatkov, Vas prosimo, da izpolnite spodnje rubrike.

1. **Spol:** ☐ Ženski ☐ Moški
2. **Starost:** _____ let.
3. **Kraj bivanja:** _____
4. **Izobrazba:**
   a. Nedokončana osnovna šola b. Končana osnovna šola
   c. Končana srednja šola d. Visokošolska izobrazba
5. **Kako pogosto obiskujete živalske vrtove?**
   a) vsaka dva meseca b) dvakrat letno c) enkrat letno d) manj kot enkrat letno
6. **Ali imate doma**
   a. **Psa** ☐ b. **Mačko** ☐ c. **Doma nimamo nobene živali** ☐

II. Prosimo Vas, da odgovorite na vprašanja, ki preverjajo Vaše poznavanje velikih zveri, ki živijo v Sloveniji. Obkrožite le en odgovor za katerega menite, da je pravilen, ali pa odgovor, ki najbolje opisuje Vaše mnenje.

1) Vse velike **zveri** v Sloveniji (medved, volk in ris) so zaradi ogroženosti zavarovane.
   a. Da.
   b. Ne.
   c. Nisem prepričan(a).

2) Odškodnine za škodo, ki jih kmetom povzročajo velike **zveri**, plača država.
   a. Da.
   b. Ne.
   c. Nisem prepričan(a).

3) Kako živijo **risi**?
   a. V parih.
   b. Samotarsko.
   c. V skupinah.
   d. Nisem prepričan(a).

4) **Ris** je v preteklosti v Sloveniji izumrl, potem pa je bil ponovno naseljen.
   a. Da.
   b. Ne.
   c. Nisem prepričan(a).

5) **Medvedi** se v Sloveniji prehranjujejo
   a. predvsem s hrano živalskega izvora (divjad, mrhovina,...).
   b. predvsem s hrano rastlinskega izvora (rastline in njihovi plodovi).
   c. s hrano živalskega in rastlinskega izvora v približno enakih količinah.

Sestavljavca in oblikovalca vprašalnika: Aleksandra Majić Škrbinšek in Iztok Tomažič

d. Nisem prepričan(a).

6) Koliko v povprečju tehta odrasel samec **volka**?
   a. 1-20 kg.
   b. 21-40 kg.
   c. 41-60 kg.
   d. Več kot 60 kg.
   e. Nisem prepričan(a).

7) Kakšna je povprečna velikost **volčjega tropa** v Sloveniji?
   a. 1-10 volkov.
   b. 11-20 volkov.
   c. 21-30 volkov
   d. Več kot 30 volkov.
   e. Nisem prepričan(a).

III. V spodnji tabeli so zapisane trditve, ki se nanašajo na Vašo podporo varovanju določene vrste velikih zveri. Prosimo, da na lestvici od 1 do 5 ocenite Vaše strinjanje s posamezno trditvijo ZA VSAKO ŽIVAL POSEBEJ.

Pomen vrednosti:

1 – se nikakor ne strinjam , **2** – se ne strinjam, **3** – nimam posebnega mnenja, **4** – se strinjam, **5** – se popolnoma strinjam

N	TRDITEV	RIS	VOLK	MEDVED
1	Za varovanje teh živali kot družba nosimo skupno odgovornost.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
2	Obstaja nevarnost, da te živali lahko napadejo in poškodujejo ljudi.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
3	V Sloveniji jih **NI** pomembno ohraniti, ker obstajajo še populacije teh vrst živali v drugih državah.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
4	Za omenjene živali želim, da so prisotne v Sloveniji, čeprav jih mogoče ne bom nikoli videl-a v naravi.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
5	Te živali bi lahko imeli za dragocene lovne vrste.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
6	Stroški varovanja in raziskovanja teh živali so previsoki.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
7	Te živali bi lahko imele resen negativen učinek na rejo domačih živali.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
8	Te živali bi lahko imele pozitivne učinke na naravno ravnovesje.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
9	Te živali smo dolžni varovati za prihodnje generacije.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
10	Te živali z lovci tekmujejo za plen kot je srnjad in jelenjad.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
11	Težko je predvideti učinke, ki bi nastali zaradi njihovega iztrebljenja.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
12	Te živali bi lahko imele resen učinek na zmanjševanje številčnosti srnjadi in jelenjadi.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Hvala za sodelovanje!

Vprašalnik pripravila: mag. Aleksandra Majič Skrbinšek in doc. dr. Iztok Tomažič