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Human dimensions of grizzly bear conservation: The social factors underlying satisfaction and coexistence beliefs in Montana, USA

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Abstract

Coexistence between large carnivores and humans is a global conservation concern. Montana (USA) is home to recovering grizzly bear (*Ursus arctos*) populations and increasing human–grizzly interactions. In 2019, we administered a survey of Montanans to investigate factors influencing normative beliefs about grizzly bear population sizes and quantify the relationship between these beliefs and satisfaction with grizzly management in the state. Using a linear regression ($r^2 = .61$), we found that residents with positive attitudes and emotional dispositions toward grizzlies or who trusted the agency were more likely to believe grizzly populations were too low. Residents who believed hunting should be used to manage conflict, were themselves hunters, had vicarious wildlife experience with property damage, believed grizzly populations were expanding, or were older were more likely to believe populations were too high. We found a negative quadratic relationship between normative grizzly bear population size beliefs and satisfaction with management, suggesting an optimal "Goldilocks" zone where coexistence is most possible. In practice, if observed Goldilocks zones are incompatible with population numbers required to meet conservation goals, considering factors influencing these beliefs may help bolster acceptance of larger population sizes.

KEYWORDS

acceptance, coexistence, conflict, grizzly bear, hunting, large carnivores, satisfaction, social psychology, tolerance, trust

1 | INTRODUCTION

Recovery of imperiled species requires public support or acceptance to achieve coexistence. Yet, large carnivores can elicit both strong public support for and opposition to conservation. For example, large carnivores can drive tourism and are often the face of conservation campaigns because many people highly value these animals (Chambers & Whitehead, 2003; Naidoo et al., 2011; Richardson & Loomis, 2009; Thomas-Walters & Raihani, 2017). On the other hand, opposition to large carnivore recovery can stem from real or perceived risks to human values and safety (Hughes & Nielsen, 2019; Lin et al., 2021; Riley & Decker, 2000; Stone et al., 2017). Despite this common "for or against" framing, evidence suggests large carnivore conservation is far more complex, where people can see the value of large carnivores and the risks they impose (Zajac et al., 2012). Globally, 24 of the 31 largest carnivore species are declining due to habitat loss, culling, human use, and lack of prey (Ripple et al., 2014). Often, fragmented large carnivore populations only persist in areas with low human footprints (Dietz et al., 2021; Wolf & Ripple, 2018), an increasingly rare resource with 75% of the world's land surface showing measurable human impact (Venter et al., 2016) and land demand rising globally (Creutzig et al., 2019). Thus, recovery of large carnivores will likely increase human–carnivore interaction and coexistence will require improved understanding of the human dimensions influencing successful conservation and management.

Although "coexistence" is widely recognized as the pinnacle of successful wildlife conservation, there remains considerable ambiguity regarding its definition and measurement (Glikman et al., 2021). In its simplest terms, coexistence is spatial overlap between wildlife and humans. Venumière-Lefebvre et al. (2022) defined coexistence as "[c]o-occurrence of sustainable carnivore populations and human endeavors with minimal human-carnivore and human-human conflict." Human cognitions are an essential component of coexistence, thus common social metrics for coexistence include acceptance, tolerance, attitudes, and behavioral intentions. Acceptance is a normative belief; that is, a judgment of what is appropriate or ideal for a given situation (i.e., what someone thinks should or ought to be, rather than what is; Schwartz, 1977). To understand acceptance, researchers often measure normative beliefs about population sizes, such as with the wildlife acceptance capacity metric (Riley & Decker, 2000), sometimes using acceptance and tolerance synonymously (Zajac et al., 2012). Differing from beliefs, attitudes are positive or negative dispositions toward an object (Ajzen & Fishbein, 1980), generally the wildlife species (Treves et al., 2013). Brenner and Metcalf (2019) suggested the tolerance/intolerance language comprises a false dichotomy, conflating attitudes and normative beliefs and excluding the possibility that people might be enthusiastic, distant, or indifferent toward wildlife. Unique from these cognitions are behavioral intentions, precursors to behavior (Ajzen, 1991), which several researchers have used to investigate support/opposition for wildlife policies or management, such as for wolf (*Canis lupus*) recovery (Hughes et al., 2020; Slagle et al., 2012) or grizzly bear (*Ursus arctos*) reintroduction (Hiroyasu et al., 2019). Behavioral studies examine past actions of individuals, like whether they have secured wildlife attractants (Nesbitt et al., 2021) or poached wildlife (Santiago-Ávila et al., 2022).

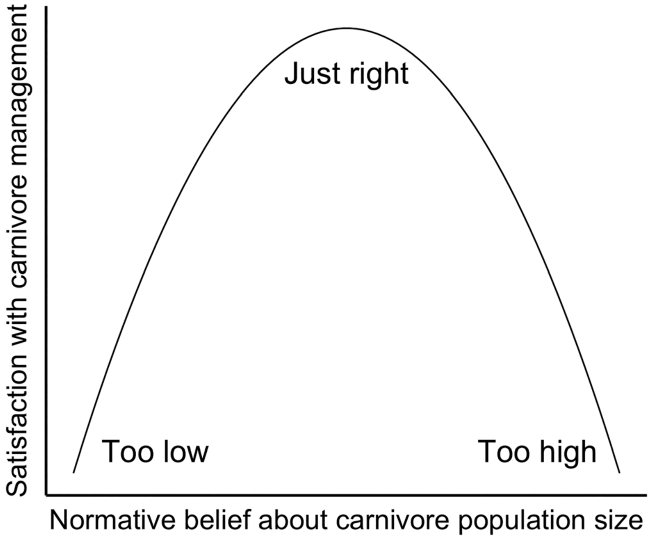

FIGURE 1 The Goldilocks principle suggests a middle ground between extremes that is "just right." Applied to wildlife management, the Goldilocks principle predicts members of the public who believe wildlife population sizes are too low or too high will be less satisfied than those who believe populations are the right size.

Public support for wildlife conservation could be measured using satisfaction with wildlife management. Rooted in the customer service literature, satisfaction is a multidimensional concept measuring the extent to which expectations have been met (Parasuraman et al., 1988). Wildlife agencies and human dimensions of wildlife researchers often measure the acceptability of wildlife management actions (Metcalf et al., 2017), but measures of satisfaction with wildlife management outcomes have generally been limited to understanding recreation experiences (Lee et al., 2004; Matt & Aumiller, 2002; Vaske et al., 1982; Watkins & Poudyal, 2020). Measuring satisfaction of the public may be useful for investigating the social landscape of coexistence with large carnivores, especially if linked to normative beliefs about population sizes (Lin et al., 2021). For example, the Goldilocks principle (i.e., an optimal middle between two extremes) has been used across many fields, including astrophysics, sociology, and education (Matysek & Tomaszczyk, 2021) and may apply to wildlife management. Using the Goldilocks principle, we suggest that people who believe wildlife population sizes are too low or too high (i.e., high or low acceptance, respectively) will be less satisfied than those who believe populations are the right size (Figure 1). Applying the principle to large carnivore conservation may help practitioners identify tools to move the public toward a Goldilocks optimum where satisfaction is maximized at the same time that species conservation is achieved. Measurement of satisfaction and normative population size beliefs, taken together with conservation targets, could provide a useful framework for managers trying to explicitly weigh trade-offs between public desires and conservation. While managers regularly measure recovery numbers explicitly, public satisfaction and acceptance are rarely measured and are instead considered implicitly when setting objectives. Here, we suggest that both biological and social factors be explicitly considered.

Several social factors have been shown to influence human coexistence with grizzly/brown bears, an iconic species with imperiled populations in North America and Eurasia (McLellan et al., 2017), but patterns are inconsistent. Response variables differ greatly among studies depending on authors' interpretation of coexistence (Hill, 2021), with much conflation of normative beliefs and attitudes, and explanatory variables frequently investigated in isolation, limiting our ability to understand the relative importance of different factors on desired outcomes. Another challenge is that human–wildlife coexistence is dependent on specific social-ecological contexts (e.g., unique culture, policy, landscape, climate). Demographic variables (e.g., gender, education, urban/rural designation), social identity (e.g., hunters, agricultural producers), experience, and knowledge may affect coexistence metrics, but findings are mixed depending on the context and study design (Andersone & Ozoliņš, 2004; Balčiauskas & Kazlauskas, 2012; Campbell, 2013; Dressel et al., 2015; Duda et al., 2001; Kubo & Shoji, 2014; McFarlane et al., 2007; Rigg et al., 2011; Røskaft et al., 2007; Wechselberger et al., 2005).

A few effects of social factors are fairly consistent across social-ecological contexts and studies of human–grizzly coexistence. For example, people tend to believe grizzlies provide benefits, be they ecological, economic, or intrinsic, along with risks (Balčiauskas & Kazlauskas, 2012; Duda et al., 2001; Hiroyasu et al., 2019; Røskaft et al., 2007). Another consistent finding is the effect of fear—those who feared grizzlies were less likely to report high coexistence metrics (Balčiauskas et al., 2020; Canepa et al., 2008; Røskaft et al., 2007; Stăncioiu et al., 2019; Wechselberger et al., 2005). Although few quantitative studies have examined the role of public trust in agencies responsible for managing grizzlies (Quinn & Alexander, 2011), several qualitative studies in North America have examined the historical and sociopolitical context of grizzly governance highlighting issues of trust, in−/out-group dynamics, procedural justice, and fairness of the distribution of costs and benefits of grizzlies (Dempsey, 2010; Hughes et al., 2020; Parker & Feldpausch-Parker, 2013; Richie et al., 2012; Yung et al., 2010). Trust is multidimensional, with each dimension having unique precursors and complex relationships with each other, but whose individual and collective effects on other relevant cognitions are context dependent (Stern & Coleman, 2015).

Here, we present analysis of data from a statewide survey about grizzly management in Montana (USA). To effectively inform conservation efforts, our goals were to (1) obtain grizzly bear-specific human dimensions data within a defined governance structure; (2) investigate the utility of several different coexistence measures, which are clearly defined; and (3) better understand interrelationships among social factors influencing human–wildlife coexistence. We present these findings at the landscape-scale in an effort to match the scale of the social-ecological challenge of grizzly conservation in Montana. We focused on interrelationships between two different coexistence metrics specific to Montana: public satisfaction with grizzly management and normative beliefs about population sizes (i.e., acceptance). Per the Goldilocks principle, we hypothesized that respondents who believed populations were too low or too high would be less satisfied, whereas those who believed population sizes were "just right" would be more satisfied with management. We used a regression approach to understand the relative importance of social factors driving normative population size beliefs. We built predictions for each social factor based on previous research investigating human dimensions of grizzlies and other large carnivores, as well as the experience of state wildlife managers.

2 | METHODS

2.1 | Study area

Historically, grizzly bears were distributed across most of western North America. In the contiguous US today, four grizzly bear populations persist within a few large tracts of mostly public lands, such as National Parks and National Forests, predominantly in mountainous or high elevation areas of the Northern Rockies, with three in Montana (Figure 2). Since listed as a threatened species under the US Endangered Species Act (ESA) in 1975, grizzly populations have grown from approximately 700–800 individuals to over 2000, and occupied range in Montana has increased approximately 80% since 2000 (Costello & Roberts, 2021; Haroldson et al., 2021; Kendall et al., 2016; US Fish & Wildlife Service [USFWS], 2021). The presence of grizzlies between their core ranges is expected to enhance long-term conservation by

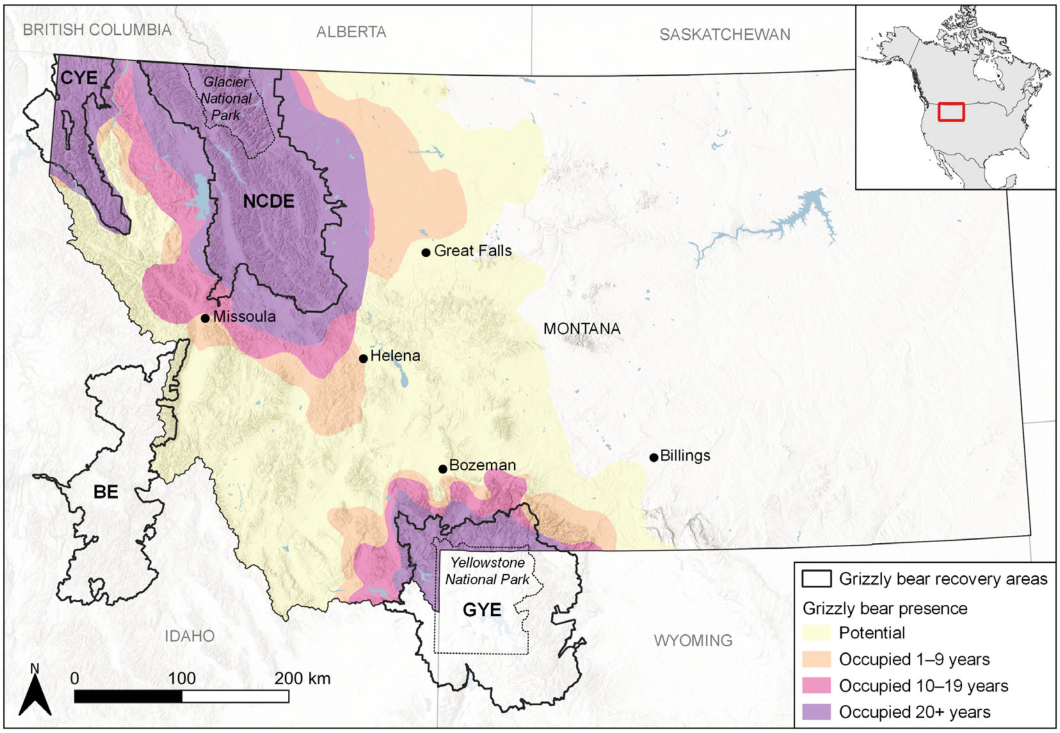

FIGURE 2 Estimated current distribution of grizzly bear populations in Montana (i.e., the "tenure" variable). Grizzly bear recovery areas are shown for the Cabinet-Yaak (CYE), Northern Continental Divide (NCDE), Bitterroot (BE), and Greater Yellowstone (GYE) Ecosystems

facilitating connectivity between existing populations and natural recolonization of recognized, but vacant, recovery areas. Most connectivity areas are in Montana and have higher human populations than core areas. In Montana, there are about 1400 individual grizzly bears, managed jointly by state, tribal, and federal agencies, with the USFWS holding ultimate authority of their management. A team of agency specialists respond to human-grizzly bear conflicts and in 2020, 372 conflicts were reported within the Northern Continental Divide (NCDE) and Greater Yellowstone Ecosystems (GYE; Costello & Roberts, 2021; Frey & Smith, 2021): 63% involving food at residences (e.g., garbage, chickens, animal feed); 21% livestock depredation; 13% human–grizzly bear interactions; and 3% other damage (e.g., beehives, orchards). It is illegal to hunt grizzlies in the contiguous US (USFWS, 2021); however, if populations were delisted, hunting may be permitted. The USFWS considered delisting the NCDE population in 2018, and twice delisted the GYE population in 2007 and 2017, but federal courts reinstated ESA protections both times (Burnham & Mott, 2021).

Montana is a large (380,000 km^2), rural state. The Rocky Mountains are in the west, consisting of conifer forests interrupted by meadows, open grasslands at lower elevations, and alpine communities at the highest elevations. The Great Plains are in the east, consisting of short grass prairie and sagebrush steppe communities interrupted by isolated, forested mountain ranges. Approximately 36% of Montana's land area is public (USGS, 2018). Forestry, agriculture, and recreation are major land uses. More than half of residents live in counties containing the seven largest cities (US Census Bureau, 2020), most of which are in western Montana and within or close to grizzly bear distribution. Rural development is increasingly common near grizzly bear range with over 93,000 homes built between 1990 and 2018 in counties overlapping current grizzly bear distribution (Headwaters Economics, 2018).

2.2 | Data collection and visualization

We collected data using a mail-back questionnaire (Supporting information S1) to Montana residents administered in 2019–2020 (IRB #172-19). Ten people pretested the questionnaire, including four graduate students, two faculty, and four Montana Department of Fish, Wildlife, & Parks (FWP) employees. We purchased an address-based, stratified random sample from Dynata, Inc. totaling 5350 addresses of adults living in an occupied dwelling in Montana (N = 814,140 people; US

TABLE 1 Variables and their associated survey question, scale, weighted mean and standard deviation (SD), and composite variable alpha

Type	Variable	Question	Scale	Scale description	Mean (SD)	Alpha
Response	Satisfaction with grizzly management	How satisfied are you with grizzly bear management in Montana?	1–5	1 = very unsatisfied; 2 = unsatisfied; 3 = neither unsatisfied nor satisfied; 4 = satisfied; 5 = very satisfied	2.87 (1.04)	
Response/ explanatory	Normative population size belief (i.e., inverse of acceptance)	I think grizzly bear populations in Montana are...	1–5	1 = much too low; 2 = too low; 3 = the right size now; 4 = too high; 5 = much too high	3.31 (1.06)	
Explanatory	*Demographics*					
	Acres (removed)	About how many total acres do you own in Montana?	Acres	Continuous	208.01 (1809.54) *0.5*	
	Age	What year were you born? (converted to age in 2019)	Years	Continuous; nonresponse imputed	49.17 (17.67)	
	Education	What is the highest level of school you have you completed?	1–5	1 = grade school; 2 = high school/GED; 3 = some college; 4 = college graduate; 5 = post graduate; nonresponse imputed	1 = 2%; 2 = 37%; 3 = 32%; 4 = 20%; 5 = 8%	
	Gender (male)	What is your gender?	0–1	0 = not male; 1 = male; nonresponse imputed	0.58 (0.49)	
	Urban	Urban/rural county designation based on respondent locations	0–1	0 = rural; 1 = urban	0.63 (0.48)	
	Identity					
	Agriculture	Do you grow crops, raise livestock, or participate in any other agricultural/ ranching activities in Montana? If yes, do you mostly do this for profit or personal consumption?	0–1	0 = not in agriculture for profit; 1 = in agriculture for profit	0.11 (0.32)	
	Hunter	Do you hunt in Montana?	0–1	0 = no; 1 = yes	0.66 (0.47)	
	Recreator (removed)	Do you participate in other outdoor recreation besides hunting in Montana?	0–1	0 = no; 1 = yes	0.96 (0.20)	
	Experience with grizzlies					
	Close to home	I have seen a grizzly bear very close to my home.	0–1	0 = no; 1 = yes	0.13 (0.34)	
	Vicarious property damage	I know people who have had their property damaged by grizzly bears at least once.	0–1	0 = no; 1 = yes	0.39 (0.49)	

(Continues)

TABLE 1 (Continued)

Type	Variable	Question	Scale	Scale description	Mean (SD)	Alpha
	Property damage	A grizzly bear has damaged my property at least once.	0–1	0 = no; 1 = yes	0.05 (0.22)	
	Tenure	(variable created using respondent locations and estimated grizzly bear distributions)	0–4	0 = grizzlies not present; 1 = potential presence of grizzlies; 2 presence of grizzlies for 1–9 years; 3 = presence of grizzlies for 10–19 years; 4 = presence of grizzlies for ≥20 years	0 = 20%; 1 = 39%; 2 = 18%; 3 = 6%; 4 = 18%	
	Cognitive and affective elements					
	Attitude	I think grizzly bears are beautiful animals.	1–5	1 = strongly disagree; 2 = disagree; 3 = neither; 4 = agree; 5 = strongly agree	3.82 (0.87)	0.93
		I think grizzly bears are important for ecosystem health.				
		I enjoy knowing that grizzly bears exist in Montana, even if I never see one.				
		I think grizzly bears can positively contribute to the outdoor economy in Montana.				
		I think grizzly bears have a right to exist in Montana.				
		Grizzly bears limit my recreational opportunities. (reverse coded)				
		Grizzly bears are a burden I'd rather not deal with. (reverse coded)				
		I think grizzly bears pose a safety risk to people I care about. (reverse coded)				
		I feel that my personal safety is threatened by grizzly bears. (reverse coded)				
		I am concerned about grizzly bears damaging things that I care about. (reverse coded)				
		Grizzly bears negatively affect my economic well-being. (reverse coded)				
	Emotional disposition	If you were on a hike in an undeveloped area of the state and saw a grizzly bear in the distance, to what extent would you feel...	-3 to 3	-3 = nervous; 3 = relaxed −3 = scared; 3 = not scared −3 = upset; 3 = pleased	−0.37 (1.63)	0.91

TABLE 1 (Continued)

Type	Variable	Question	Scale	Scale description	Mean (SD)	Alpha
		If you were on a walk near your home and saw a grizzly bear in the distance, to what extent would you feel...				
	Expansion belief, imposed (removed)	I think grizzly bears are being imposed on me by other people.	1–5	1 = strongly disagree; 2 = disagree; 3 = neither; 4 = agree; 5 = strongly agree	2.57 (1.4)	
	Expansion belief, natural	I think grizzly bear populations are expanding naturally.	1–5	1 = strongly disagree; 2 = disagree; 3 = neither; 4 = agree; 5 = strongly agree	3.69 (1.07)	
	Knowledge	How would you describe your knowledge of grizzly bears?	1–4	1 = I do not know much about grizzly bears in Montana; 2 = I know a bit about grizzly bears in Montana; 3 = I know a fair amount about grizzly bears in Montana; 4 = I consider myself an expert on grizzly bears in Montana	2.50 (0.63)	
	Normative hunting beliefs	Regulated hunting of grizzly bears should be used as a tool to reduce grizzly bear-human conflict.	1–5	1 = strongly disagree; 2 = disagree; 3 = neither; 4 = agree; 5 = strongly agree	3.52 (1.26)	0.82
		People should have the opportunity to hunt grizzly bears as long as their population can withstand hunting pressure.				
	Procedural justice (removed)	The average citizen can have an influence on grizzly bear management decisions.	1–5	1 = strongly disagree; 2 = disagree; 3 = neither; 4 = agree; 5 = strongly agree	3.14 (0.78)	0.79
		I have the opportunity to provide input on grizzly bear management decisions.				
		Wildlife agencies listen to my input.				
		Wildlife agencies respect my way of life.				
	Trust	I trust that FWP knows how to effectively manage grizzly bear populations.	1–5	1 = strongly disagree; 2 = disagree; 3 = neither; 4 = agree; 5 = strongly agree	3.57 (0.91)	0.94
		I trust that FWP thinks in a similar way as I do about grizzly bears.				
		I trust that FWP knows how to respond to grizzly bear-human conflict.				

(Continues)

TABLE 1 (Continued)

Type	Variable	Question	Scale	Scale description	Mean (SD)	Alpha
		I trust that FWP provides the public with the best available information on how to reduce grizzly bear-human conflict.				
		I trust that FWP tells the truth about grizzly bears and their population status.				
		I trust that FWP would take similar actions as I would to manage grizzly bears.				

Note: The weighted median is shown in italics for acres. The weighted frequency distribution is shown for education and tenure.

Census Bureau, 2020). FWP administered the survey using a modified tailored design (Dillman et al., 2014) with three questionnaire mailings, each 2–4 weeks apart.

Using a modified framework from Brenner and Metcalf (2019), we visualized the data on two intersecting axes—acceptability of grizzlies (i.e., the inverse of normative population size beliefs) and attitudes toward grizzlies. This approach allowed us to visualize respondents who had: negative attitudes and thought populations were too high (i.e., "intolerant" to grizzlies), negative attitudes and thought populations were too low (i.e., "tolerant" to grizzlies, which they do not like but are willing to endure), positive attitudes and thought populations were too low (i.e., "enthusiastic" of grizzlies), and positive attitudes and thought populations were too high (i.e., "pragmatic" to grizzlies, which they like but with caution).

2.3 | Theoretical framing

2.3.1 | Public satisfaction and normative beliefs about grizzly bear population sizes

We tested the utility of the Goldilocks principle for explaining how *satisfaction with management* varies with *normative population size beliefs* (variables are italicized for clarity when first introduced in the text). We asked respondents about their satisfaction with grizzly management in Montana and their normative beliefs about the grizzly population size (Table 1). We tested for a negative quadratic relationship between satisfaction and normative population size beliefs, expecting respondents who believed populations were too low or too high would be less satisfied, while those who believed population sizes were "just right" would be more satisfied with management (Figures 1 and 3). For this study, we did not measure actual conservation targets.

2.3.2 | Factors influencing normative beliefs about grizzly bear population sizes

We used multiple regression to assess the relative strength of several factors for predicting normative population size beliefs, while controlling for other factors (Table 1, Figure 3). We predicted those owning fewer *acres* of land (Naughton-Treves et al., 2003), younger individuals (*age*; Campbell, 2013; Dressel et al., 2015; Heneghan & Morse, 2018; McFarlane et al., 2007; Røskaft et al., 2007; Williams et al., 2002), those with

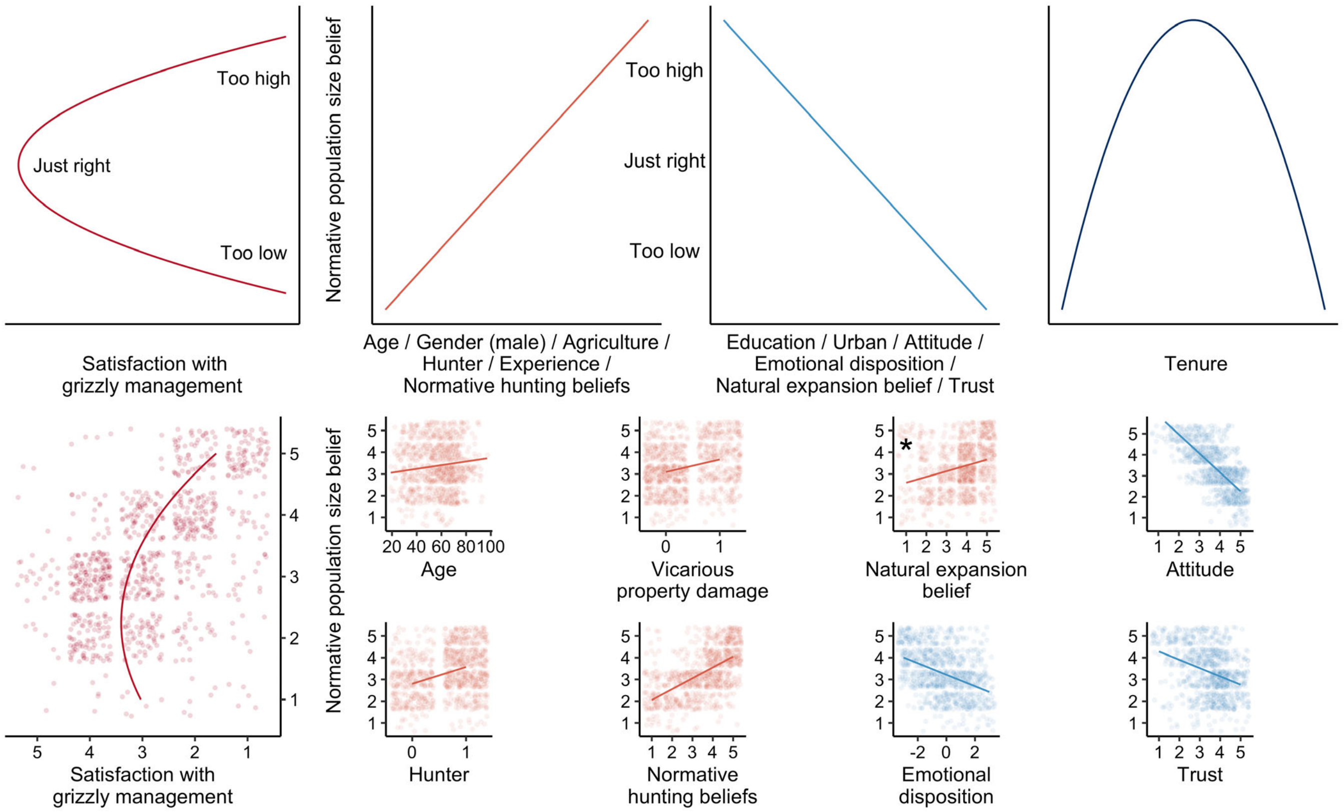

FIGURE 3 Top row—Theoretical framework and predicted bivariate relationships. We predicted satisfaction and normative population size beliefs would exhibit a negative quadratic relationship, in red. We predicted that normative population size beliefs would exhibit a positive bivariate relationship with variables in orange, a negative bivariate relationship with variables in light blue, and a negative quadratic relationship with tenure in dark blue. We predicted no relationship between knowledge and normative population size belief. Acres, recreator, imposed expansion belief, and procedural justice variables are not included here because we dropped them from the analysis. Bottom row—Bivariate-weighted relationships of variables in the final model for satisfaction in red, and in the final normative population size belief model (in orange for positive relationships and light blue for negative relationships). The asterisk indicates a bivariate relationship that contradicted our prediction. We jittered the points in these plots to improve data visualization. Plots in the left column have been rotated 90° counterclockwise such that the *x*-axes are vertical and the *y*-axes are horizontal for ease of comparison with the *y*-axes in the other plots.

higher *education* (Dickman et al., 2013; McFarlane et al., 2007; Røskaft et al., 2007; Williams et al., 2002), and individuals in *urban* (vs. rural) areas (based on US Census designation; Balčiauskas et al., 2020; Booth & Ryan, 2016; Heneghan & Morse, 2018; Røskaft et al., 2007) would believe grizzly populations were too low. We predicted men (*gender*; Williams et al., 2002), individuals in *agriculture* (Balčiauskas et al., 2020; Dressel et al., 2015; Kubo & Shoji, 2014; Røskaft et al., 2007; Sage et al., 2022; Wechselberger et al., 2005; Williams et al., 2002), *hunters* (Naughton-Treves et al., 2003; Røskaft et al., 2007), and other outdoor *recreators* (McFarlane et al., 2007) would believe grizzly populations were too high. We predicted those with more negative experiences with grizzlies would believe grizzly populations were too high (Carter et al., 2014; Dorresteijn et al., 2014; Dressel et al., 2015; Eriksson et al., 2015; Riley & Decker, 2000; Stăncioiu et al., 2019; Wechselberger et al., 2005) based on experiences *close to home*, with *vicarious property damage*, and direct *property damage*. We developed a spatial–temporal variable (*tenure*) based on how long grizzlies had occupied an area (Figure 2, Supporting Information S1), predicting respondents would acclimate to grizzlies after an initial negative reaction (Booth & Ryan, 2016; Carter et al., 2012; Dressel et al., 2015; Houston et al., 2010; Karlsson & Sjöström, 2007), such that those in low and high tenure areas would more likely believe grizzly populations were too low, but those with medium tenure would more likely believe grizzly populations were too high (Zimmermann et al., 2001).

We included psychometric variables previously shown to influence support/opposition of large carnivore conservation (Table 1, Figure 3). We predicted those who had more positive *attitudes* toward grizzlies (Riley & Decker, 2000), had *trust* (defined multidimensionally) in the agency (Heneghan & Morse, 2018; Sponarski et al., 2014; Zajac et al., 2012), and had a high sense of *procedural justice* (i.e., perceived control over wildlife outcomes; Bjerke et al., 2000; Colquitt & Rodell, 2015; Lauer et al., 2018; Rotter, 1966; Zajac et al., 2012) would believe grizzly populations were too low. Following Sponarski et al. (2015), we elicited *emotional dispositions* from respondents under two different scenarios and predicted those with more positive emotional dispositions would believe grizzly populations were too low (Canepa et al., 2008; Heneghan & Morse, 2018; Johansson et al., 2012; Johansson et al., 2019; Røskaft et al., 2007; Stăncioiu et al., 2019). Because qualitative research on the governance of wildlife and public lands suggests control and imposition are important factors in conservation support/opposition (Dempsey, 2010; Guercio & Duane, 2009; Hintz, 2003; Hughes & Nielsen, 2019; Parker & Feldpausch-Parker, 2013; Richie et al., 2012; Yung et al., 2010), we predicted people who thought grizzly populations were expanding naturally (*expansion belief, natural*) would believe populations were too low, whereas those who thought populations were imposed on them (*expansion belief, imposed*) would believe populations were too high. Due to mixed evidence regarding the relationship between carnivore-specific knowledge and conservation support (Heneghan & Morse, 2018; Hiroyasu et al., 2019; McFarlane et al., 2007; Wechselberger et al., 2005) and the socio-cognitive complexity of human decision-making (Dietsch et al., 2018; Gore et al., 2016; Heberlein, 2012), we predicted no relationship between self-reported grizzly *knowledge* and normative population size beliefs. Because grizzly hunting may be permitted if grizzlies are delisted, we wanted to investigate how *normative hunting beliefs* (Campbell & Mackay, 2003; Duda et al., 2001) influenced beliefs about grizzly population sizes. We predicted those who believed hunting should be used as a tool to reduce human–bear conflict and regulated grizzly hunting should be allowed would believe grizzly populations were too high.

2.4 | Analysis

We weighted responses based on demographic variables and nonresponse (BBER, 2020), calculating an initial weight based on the probability of inclusion using the 2018 5-year estimate for the adult population (US Census Bureau, 2020), adjusted this weight for nonresponse, and calibrating based on demographic variables including sampling strata, age, gender, education level, urban/rural designation, and within/outside the grizzly range (Battaglia et al., 2016; Haziza & Beaumont, 2017; Haziza & Lesage, 2016; Valliant et al., 2013). We imputed missing data for these variables using the multiple imputation method (Berglund & Heeringa, 2014; Rubin, 1987) prior to weighting.

We used multiitem scales in the survey to measure attitudes toward grizzlies, emotional dispositions, normative hunting beliefs, multiple dimensions of trust, and procedural justice variables (Table 1) and performed confirmatory factor analyses for variable reduction. We excluded "I don't know" responses from analyses. We used the fa.parallel function in the psych package (Revelle, 2019) in R (version 3.6.1; R Core Team, 2019) finding minimum residuals through ordinary least squares with a varimax rotation. We measured scale reliability for composite variables using a Cronbach's alpha (α) cut-off of 0.65 (Vaske, 2008). After creating composite variables using the mean of item responses, we removed respondents with incomplete data and all part-time residents. We standardized all nonbinary variables, treating those as continuous and binary variables as categorical.

We built two different models to achieve our objectives. First, we tested the relationship between satisfaction with grizzly management and beliefs about grizzly population size by contrasting linear and quadratic relationships using the svyglm function in the survey package (Lumley, 2020) with survey weights. We measured model fit with Akaike's information criterion (AIC) such that the final model had the lowest AIC. Second, we built a linear model of factors related to beliefs about grizzly population sizes. We fit a saturated model (survey package, svyglm function) with no interaction terms, a squared term for tenure, and survey weights. Several of our explanatory variables were highly correlated (log acres and agriculture, weighted $r = .61$; imposed expansion belief and attitude, weighted $r = -.69$; procedural justice and trust, weighted $r = .63$) so we removed the variable in each pair with the weaker relationship to the response variable to improve model stability. We also removed the "recreator" variable due to lack of variation. We measured model fit with AIC and performed backward, forward, and iterative model selection to generate a candidate set of models. We chose the final model as the one with the lowest AIC among the candidate set. We performed diagnostic tests for both final models (Table 2, Supporting Information S1).

3 | RESULTS

We received 1758 responses to the survey; 688 were returned by the US Postal Service as undeliverable, making overall response rate 37.7% (confidence interval

TABLE 2 Sample size (n), degrees of freedom (df) Akaike's information criterion (AIC), analysis of variance (ANOVA) p values, goodness-of-fit tests, and mean square errors (MSE) from k-fold cross-validation are shown for each regression analysis (linear vs. quadratic relationships for satisfaction with grizzly bear management as a function of belief about grizzly bear population sizes; saturated and reduced (via backward, forward, and iterative selection) models for the belief about grizzly bear population sizes model)

	Y = Satisfaction with grizzly management		Y = Normative population size belief		
	Quadratic	Linear	Saturated	Selection = backward	Selection = forward, iterative
n, df	933, 930	933, 931	933, 915	933, 921	933, 924
AIC	623.4	696.7	385.9	377.4	377.2
Adj R^2	.34	.25	.61	.61	.61
ANOVA	versus null, $p < .001$	versus null, $p < .001$		versus null, $p < .001$ versus saturated, $p = .94$	versus null, $p < .001$ versus saturated, $p = .64$
HLGOF (number of tests where $p < .05$)	5	12	1	0	0
k-fold cross-validation MSE	null = 1.13 0.72	null = 1.13 0.82	null = 0.99 0.37	null = 0.99 0.37	null = 0.99 0.37

Note: We used the Hosmer–Lemeshow goodness-of-fit (HLGOF) test with 4–15 groups per model and report the number of times out of 12 that the test was significant, whereby significance indicates lack of fit.

± 3.5%). After removing incomplete responses for variables in our saturated model and nonresidents, we included 933 responses. Here, we report descriptive statistics for respondents weighted to provide inference to all Montana adults. Respondents included in our analysis were 59 years old (mean), 58% were male, 66% were hunters, 11% were in the agricultural industry, 63% were from urban counties, and 41% lived within grizzly range (Table 1). Respondents were most commonly high school graduates (37%) and owned a median of 0.5 acres. On average, respondents reported slightly negative satisfaction levels with grizzly management (2.87/5.00), believed grizzly population sizes in Montana were about right to too high (3.31/5.00), and had a positive attitude toward grizzlies (3.82/5.00). Adapting the typologies of Brenner and Metcalf (2019), almost one third (31%) of respondents were between pragmatic and enthusiastic (i.e., had a positive attitude and believed populations were just right; Figure 4), about one quarter (26%) were pragmatic (i.e., had positive attitudes and believed populations were too high); another quarter (24%) were enthusiastic (i.e., had positive attitudes and believed populations were too low), and 15% were intolerant (i.e., had negative attitudes and believed populations were too high). The remainder were either between quadrants or indifferent (Supporting Information S1). On average, respondents in the enthusiastic quadrant were satisfied with grizzly management (3.30/5.00), whereas those who were pragmatic (2.44/5.00), intolerant (1.84/5.00), or indifferent (2.00/5.00) were not. Respondents who had positive or

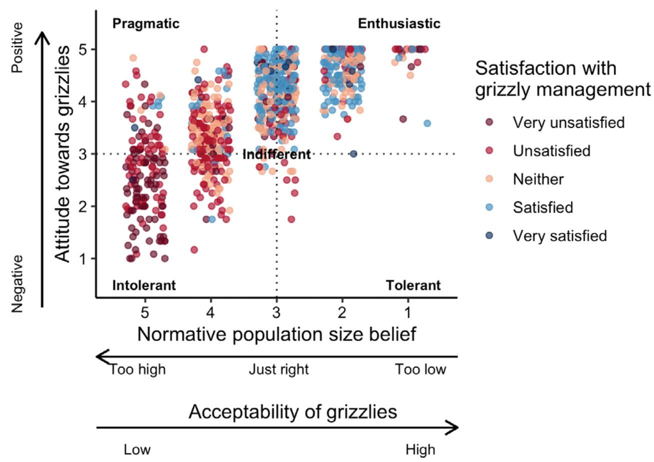

FIGURE 4 Relationship between normative population size belief, attitude toward grizzlies, and satisfaction with grizzly management for each respondent. The x-axis shows normative population size belief for grizzlies, which is the inverse of acceptability such that a belief that the grizzly population is too high is associated with low acceptability, and vice versa. The location of each point is the relationship between a respondent's normative belief about grizzly population sizes (i.e., acceptability) and attitude toward grizzlies. Those who believe populations are too high (i.e., low acceptability) and have a negative attitude toward grizzlies are in the "intolerant" quadrant. Those with: high acceptability and negative attitudes are "tolerant," low acceptability and positive attitudes are "pragmatic," high acceptability and positive attitudes are "enthusiastic," moderate acceptability and neutral attitudes are "indifferent" *Source:* adapted from Brenner and Metcalf (2019). Satisfaction with grizzly management is shown in color. We jittered the points to improve data visualization

negative attitudes and believed populations were just right were satisfied (3.41 and 3.16/5.00, respectively), those with neutral attitudes and believed populations were too high were unsatisfied (2.33/5.00), and the one respondent who had a neutral attitude and believed populations were too low was satisfied (5.00/5.00).

3.1 | Public satisfaction and normative beliefs about grizzly bear population sizes

As predicted, we found a quadratic relationship between satisfaction with grizzly management and beliefs about grizzly population sizes (Table 2, Figure 3). This quadratic relationship was a better fit than a linear relationship and significantly different from the null ($p < .001$), explaining 36% more variation (adjusted $R^2 = .34, .25$, respectively), and reducing MSE 12.2% in the k-fold cross-validation (MSE = 0.72, 0.82, respectively). However, there was some evidence of lack of fit as 5 of the 12 Hosmer–Lemeshow goodness-of-fit (HLGOF) tests were significant.

3.2 | Factors influencing normative beliefs about grizzly bear population sizes

Our final model predicting beliefs about grizzly population sizes was significant with good fit (Table 2). Forward and iterative model selection resulted in the same model (i.e., the final model), which had the lowest AIC in the candidate set. The final model differed significantly from the null ($p < .001$) but not the saturated ($p = .64$). The final model explained 61% of the variation, relatively high for social science studies. None of the HLGOF tests were significant, providing evidence of good fit. MSE decreased by 63% in the final model compared to the null in the k-fold cross-validation (MSE = 0.37, 0.99, respectively). All parameter estimates in the final model were consistent with bivariate correlations (Table S2; Figures 3 and 5).

Most variables in the final model were significant, with large positive effects on beliefs about grizzly population sizes (Table S2, Figure 5b). Those who identified as a hunter, expressed normative hunting beliefs, had more experiences with grizzlies, or were older believed that grizzly populations were too high, consistent with our predictions. Normative hunting beliefs had the largest positive effect (standardized effect size [SES] = 0.26, $p < .001$; Figure 5b). For example, on average, for each unit increase in normative hunting beliefs, there was an increase of 0.22/5.00 in the response, holding all else equal (see Supporting Information S1 for standardized and unstandardized coefficients). Being a hunter had the second highest positive effect (SES = 0.20; $p = .01$), followed by vicarious property damage (SES = 0.19; $p = .005$). Holding all other variables constant, mean model-predicted response of hunters was 0.22/5.00 higher than that of nonhunters, and mean model-predicted response for someone who knew someone whose property was damaged by grizzlies was 0.19/5.00 higher than those who did not. Age had a significant but small positive effect (SES = 0.07; $p = .02$) where mean model-predicted response about population size increased by 0.04/5.00 for every 10 years of age, all else being equal. Belief in natural expansion had a positive relationship, contrary to our prediction, such that every unit increase in the natural expansion belief increased mean model-predicted response by 0.1/5.00 on average, holding all else constant (SES = 0.01, $p = .003$).

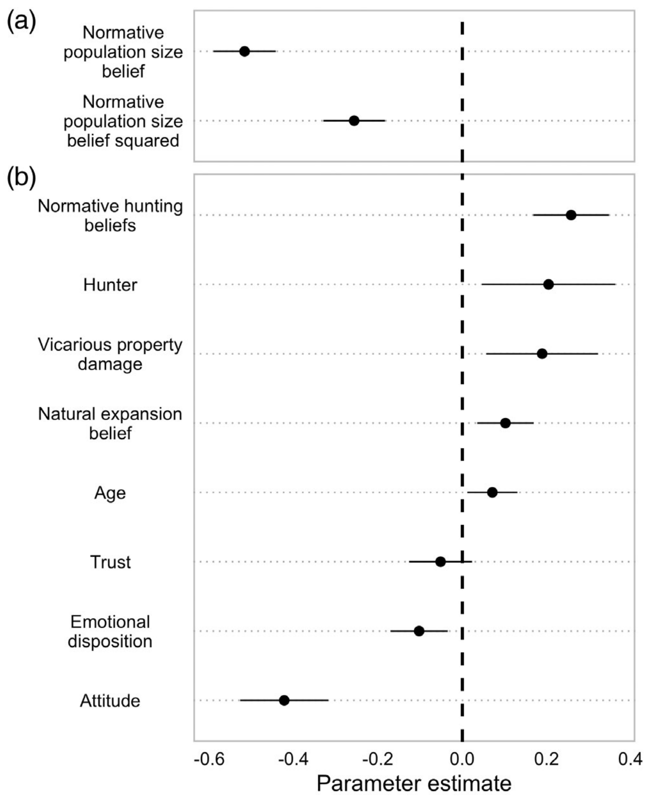

FIGURE 5 Standardized parameter estimates for the models predicting satisfaction with grizzly bear management (a) and predicting normative population size beliefs (b) after model selection (based on AIC). The circle symbol denotes the point estimate and the bars denote the 95% confidence interval. In (a), negative parameter estimates indicate a negative quadratic relationship. In (b), negative parameter estimates indicate a negative relationship with normative population beliefs (e.g., negative attitudes are associated with normative beliefs that populations are too high), and vice versa

Several variables had negative effects on beliefs about grizzly population sizes (Table S2, Figure 5b) and were consistent with our predictions. Those with positive attitudes or emotional responses to grizzlies, or who trusted the management agency believed grizzly populations were too low. Attitude had the largest effect (SES $= -0.42$; $p < .001$), such that for each unit increase in attitude, there was a decrease in population size response of 0.51/5.00 on average, holding all else constant. Emotional responses to grizzlies also had a negative effect (SES $= -0.1$, $p = .003$), such that for each unit increase in emotions, there was a decrease in mean model-predicted response by 0.07, all else being equal. Finally, trust in the management agency was in the final model but had an insignificant and small negative effect on population size response (SES $= -0.05$, $p = .18$), such that a unit increase in trust decreased mean model-predicted response by 0.06, holding all else constant.

Several variables were not included in the final model because they did not explain enough additional variation, one consistent with our prediction (i.e., knowledge), and several contrary to our predictions on the effects of demographics and identity (i.e., education, gender, urban, agriculture, outdoor industry) and experience with grizzlies (i.e., close to home, property damage, tenure) on normative population size beliefs.

4 | DISCUSSION

Maintaining human well-being while conserving wildlife is the essence of human–wildlife coexistence. Our study focused on human dimensions of human–grizzly bear coexistence in Montana, which has maintained the largest distribution and population size of grizzly bears in the contiguous US for multiple decades amid human land uses dominated by forestry, agriculture, and recreation. As such, our analysis was intended to inform conservation efforts specific to the social-ecological context of Montana. At the same time, we intended to advance human dimensions of wildlife research by demonstrating the utility of several different coexistence metrics, including satisfaction with management, normative beliefs about population sizes (i.e., acceptance), and attitudes toward the species. We illustrated the relationship between public satisfaction and beliefs about grizzly bear population sizes, as well as the relative importance of several factors driving those beliefs (Table 2, Figures 3 and 5).

We found that satisfaction with grizzly bear management followed the Goldilocks principle where satisfaction peaks when people perceive that wildlife population levels are neither too high nor too low (Figures 3–5a). Our findings are consistent with at least one other study relating satisfaction with preferred wolf population sizes for different interest groups in Sweden (Lin et al., 2021). Satisfaction measures, when applied to conservation of large carnivores such as grizzlies, may provide one important social indication of coexistence. While the normative belief metric we used here revealed what the public believes the populations *should* be (relative to what the public currently perceives the populations to be), these beliefs may be incompatible with the actual population numbers required to meet conservation goals and do not necessarily reflect actual population numbers. For example, if the Goldilocks optimum is not achieved because the public believes the population is too big, while the actual population is inadequate for long-term conservation, it would indicate that public support for recovery is lacking. On the other hand, if the Goldilocks optimum is not achieved because the public believes the population is too small, it would indicate support for recovery. Considering the factors that influence these beliefs, discussed below, may help practitioners bolster public support for larger population sizes, where it is lacking.

Both cognitive (e.g., beliefs, attitudes) and emotional components play a role in human coexistence with grizzly bears. Attitude toward grizzlies was the largest predictor of normative population size beliefs in Montana, with double the absolute effect size of the next largest predictor, normative hunting beliefs (Table S2, Figures 3 and 5b). Results confirm others' work showing people exhibit a range of emotional dispositions toward wildlife, from both positive to negative, that influence normative beliefs (Røskaft et al., 2007; Sponarski et al., 2015; Vaske et al., 2013). While attitudes had a stronger effect than emotional dispositions on beliefs about population size in our regression, it is likely that these two components are not independent from one another. Indeed, attitude strength is generally thought to be influenced by emotions as well as deeply held values and personal experience (Ajzen, 2005; Heberlein, 2012). Consistent with other human dimensions of wildlife findings, we also show that trust, which has both cognitive and affective components (Stern & Coleman, 2015), influences coexistence metrics (Heneghan & Morse, 2018; Sponarski et al., 2014; Zajac et al., 2012), such that those who trust the agency are slightly more likely to believe populations are too low, although more research is needed into this important and underexplored relationship. Although it is often assumed that more informed individuals exhibit pro-conservation beliefs and behaviors, leading to investments in public education (Bruskotter & Wilson, 2013; Dietsch et al., 2018; Gore et al., 2016; Heberlein, 2012), we found that self-reported knowledge about grizzlies did not have an effect on beliefs about population sizes. Contrary to our prediction, both population expansion beliefs (natural and imposed on Montanans by other people) were positively correlated with beliefs about population sizes (weighted $r = .27, .47$ respectively), suggesting that people who recognized that grizzlies are expanding, regardless of cause, tend to think there are too many of them (Table S6). Although we were unable to isolate the effect of this imposition in our model, these bivariate correlations are consistent with other wildlife studies in Montana (Riley & Decker, 2000).

For the management of predators and other species with which humans conflict, hunting beliefs and participation in hunting may be important for understanding, and possibly enhancing, coexistence. With respect to grizzlies in Montana, we found that hunters or those who thought grizzly hunting should be permitted to reduce conflict tended to believe grizzly populations were too high (Table S2, Figure 5b). Given that grizzly bear hunting is currently prohibited, this finding may reflect a general belief that wildlife populations should be managed through hunting (perhaps a reflection of the North American Model of Wildlife Conservation), a desire and justification for the opportunity to hunt grizzly bears, or a belief that grizzly bears are negatively affecting other game species and reducing those hunting opportunities. Some research has found that allowing hunting improved relationships between community members and wildlife managers by empowering people to address conflict (or the perception thereof, perhaps regardless of whether hunting does or does not actually reduce conflict) and to accrue benefits from a wildlife species (Jones & Murphree, 2004; Loveridge, Reynolds, & Milner-Gulland, 2006; Murphree, 2001). For some species where hunting is prohibited, community members may seek to exert control over wildlife costs and benefits, whether through legal means or by taking matters into their own hands when they “shoot, shovel, and shut up” (Hughes & Nielsen, 2019; MacKenzie, 2011; Schusler et al., 2000). Grizzly hunting may be a highly effective strategy to improve satisfaction with management in a state like Montana, where the public has positive attitudes toward grizzlies and supports grizzly hunting (Costello et al., 2020). That being said, human dimensions research on wolves suggests that legal hunting does not improve attitudes (Hogberg et al., 2016). Much work is needed to fully untangle the complex species-specific relationships between hunting, hunting beliefs, population beliefs, and satisfaction with wildlife management.

Although there is growing evidence that direct interactions with wildlife species have meaningful effects on people's attitudes and normative beliefs about that species, our data suggest that social interactions among people *about* interacting with wildlife may play a similarly important role. In our final model, vicarious property damage had a greater effect than personal damage on beliefs about grizzly population size (Table S2, Figure 5). In places like Montana, where direct experience with grizzlies is currently rare (e.g., 5% experienced property damage, 17% have feared for their safety, 13% have seen a bear close to their home), we suspect that word of mouth and notoriety of conflict situations substantially influences beliefs about the species. It may be that vicarious wildlife conflict inflates perceptions of risk, affecting normative beliefs about population sizes as a manifestation of the availability heuristic (Tversky & Kahneman, 1973). For example, in a study in Montana, risk perception of cougar attacks influenced wildlife acceptance capacity even though the vast majority of respondents had no actual experience with cougars (Riley & Decker, 2000). In contrast in Nepal, where experiences with carnivores are common, people accepted the risks as part of their day-to-day lives (Carter et al., 2012). Although those who had a family member threatened or attacked were more likely to hold negative attitudes toward tigers, hearing about threats or attacks on livestock or people had no effect on attitude (Carter et al., 2014). Although differences between risk perceptions in Nepal and Montana are likely attributable to wide variance in many social and cultural factors, this evidence may suggest that experiences shared by word of mouth in places where actual experience is low may be more prone to inflation of perceived risks because those instances readily come to mind when asked, despite limited personal evidence. Human coexistence with large carnivores is affected at least as much by human judgment heuristics and social norms as probabilistic risk (Bjerke et al., 1998; Emel, 2006; Kaltenborn et al., 1999; Knight, 2000; Nie, 2001; Wilson, 1997). More cross-cultural and social-network research is needed to fully elucidate the effect and mechanisms of vicarious wildlife conflict.

We found that tenure, another experience variable (albeit less direct), did not exhibit a quadratic relationship with beliefs about grizzly population size as we had predicted. Instead, we found considerable variation in grizzly population size beliefs at every level of tenure. Although other research on spatial–temporal overlap with large carnivores found some evidence of this relationship (Booth & Ryan, 2016; Carter et al., 2012; Dressel et al., 2015; Houston et al., 2010; Karlsson & Sjöström, 2007), our findings may indicate that beliefs about grizzly population sizes in Montana are more complex than spatial–temporal dynamics alone. For example, a study on grizzly population beliefs in Montana and Idaho found that ranchers proximate to grizzly bear range had more negative experiences with bears, but were more accepting, perhaps because they were generally younger and did not rely exclusively on agriculture for income compared to those farther away (Sage et al., 2022). Furthermore, given that direct experience was low in our study and tenure with bears was unimportant (at least on the time scale of grizzly conservation efforts in the United States), acceptance of grizzlies may be heavily influenced by indirect experience communicated through personal networks, which is specific to each person and can be unrelated to location, but future research on this topic is needed.

Very few demographic and identity variables were important predictors of population size beliefs, suggesting that cognitions, emotions, and experiences are much more important for human–grizzly bear coexistence. In addition to the hunter variable, age was the only other that remained in the final model, such that older individuals were more likely to think populations were too high. All other demographic/identity variables fell out of the model. Perhaps most important among these is the assumed urban/rural divide, where urbanites are expected to support wildlife conservation and rural residents to lament wildlife impacts to their ways of life (Heneghan & Morse, 2018; Williams et al., 2002). Instead, although beliefs about grizzly population sizes were significantly different among urban and rural residents, on average, this divide dissolved when we accounted for psychometric variables. This finding is consistent with other wildlife research that found no urban/rural effect (Andersone & Ozoliņš, 2004; Booth & Ryan, 2016; Heneghan & Morse, 2019; Kleiven et al., 2004; McFarlane et al., 2007) and likely supports conclusions from other disciplines that rural/urban populations are far from monoliths and instead require a more nuanced understanding that embraces their diversity, complexity, and overlap (Hughes & Nielsen, 2019; McCarthy, 2002; Neumann, 2005; Wilkinson, 1991). Perhaps for similar reasons, several other demographic (i.e., education, gender) and identity (i.e., agriculture, outdoor industry) variables were not important predictors of population size beliefs. This finding warrants more investigation, especially in other places where urban–rural contrasts may be more stark than Montana.

Our study helps identify opportunities for future research. First, some variables excluded from the final model may be too complex or interrelated with attitudinal measures to be represented by these data, demonstrating the value of multivariate techniques or mixed methods approaches for understanding human dimensions of wildlife issues. For example, using structural equation modeling may illuminate complex relationships between satisfaction, normative population size belief, and attitudes. Second, more research is needed to tease apart the relationships between hunting beliefs on metrics of coexistence, especially because hunting may be permitted if grizzly populations are delisted in the contiguous US. Third, because vicarious wildlife conflict with grizzlies, rather than direct, was the most important predictor of population size belief of the experience scenarios, understanding how vicarious wildlife conflicts spread may help differentiate the effects of narratives versus actual grizzly encounters. For example, how do social networks influence beliefs about grizzlies, particularly when experiences with these animals are exceedingly rare? Fourth, analyzing longitudinal data could reveal how satisfaction with management and beliefs about grizzly population sizes change over time, and how the drivers of these variables change with context. As grizzly and human populations continue to expand into one another, it may be important to understand how acceptance might change as more people are exposed to living with grizzlies. Fifth, adding more rigorous social data to ecological models or vice versa may elucidate the relative effects of social and ecological constraints on large carnivore conservation and thus be more predictive of coexistence at a landscape scale (Struebig et al., 2018). For example, assessing current public acceptance and satisfaction, its distance from conservation targets, and its drivers, in the context of actual population size may be helpful for predicting public reactions to future management decisions designed to increase population size.

We illustrated the importance of clearly articulating different metrics of coexistence in human dimensions research and provided evidence for Brenner and Metcalf's (2019) hypothesis that the tolerance/intolerance language wildlife managers and social scientists use sets up a false dichotomy (Figure 4). Only about one fourth of Montanans can be described as intolerant and very few can be described as tolerant or indifferent to grizzlies—most can be described as pragmatic, enthusiastic, or somewhere in between. Practitioners trying to understand the current pulse of human dimensions of wildlife may find these distinctions useful because it suggests two mechanisms for reducing intolerance: positively influencing attitudes or positively influencing acceptance. Mapping satisfaction onto these two different dimensions of coexistence, perhaps alongside human behavior (Lehnen et al., 2022), allows practitioners to see a more complete picture of the public's views on wildlife and wildlife management.

Practitioners seeking to move the public toward a Goldilocks optimum that maximizes both conservation targets and satisfaction, and reduces intolerance, may wish to target some of the cognitive, emotional, and experiential drivers identified in this study. For example, we found that beliefs that grizzlies pose a safety risk negatively affected attitude, a major driver of acceptance. Morehouse et al. (2020) found that participants in bear safety workshops reported an increased sense of safety and security, possibly revealing a means to shift people toward more positive attitudes. Wildlife advocates could counter the negative influence of vicarious property damage with a sustained campaign of firsthand stories by people successfully coexisting with bears. Experiential workshops addressing fear (Johansson et al., 2019) may help shift emotional responses away from those negatively affecting acceptance. Broadening relationships and strengthening processes for meaningful input into decision-making could increase trust in agencies, a factor associated with higher acceptance. Finally, because self-reported knowledge was not an important driver of population beliefs in our model, we caution against implementing strictly "information out" campaigns as a means to influence acceptance. Not only is the evidence for the effectiveness of this "knowledge deficit" intervention suspect (Heberlein, 2012), it risks insulting those with whom practitioners seek partnership, further eroding trust and reinforcing ideas about others imposing on locals to bear the costs of wildlife conservation. This evidence from Montana adds to the growing body of research suggesting coexistence is driven substantially by social factors as well as biophysical, and highlights the need for increased research attention on the complexity and interrelatedness of these human dimensions of wildlife.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data supporting this work require human subjects protections and may be available upon request without personal identifying information.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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