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A global survey of the societal benefits of trophy hunting in Africa

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ABSTRACT

African trophy hunting is controversial. Central to the debate on this practice is whether it may be justified by any broader provisions to African society. These typically include meat supply to poor communities, problem animal control, and the funding of conservation and community development. The societal role of African hunting is as contested as the practice itself, with proponents advocating for the benefits of hunting, while critics point to these being inadequate. Little is known about the role of location and demography in the debate on hunting benefits. Here we circulated an anonymous online survey through our international networks. We asked respondents to indicate which (if any) benefits they thought may justify the practice and whether they supported African trophy hunting, or not. We also collected data on respondent geographic location, age, gender, and employment within conservation. The 5755 responses were analysed using multiple correspondence analysis and provided strong evidence for an association between the level of support/rejection of trophy hunting and potential benefits that were perceived to justify the practice. Funding of wildlife conservation through hunting was the most frequently selected benefit, even among many respondents with a neutral or slightly negative view toward trophy hunting as a practice. Respondents strongly opposed to trophy hunting were more likely to reject all societal benefits of hunting. There was some divergence in views between Africa-based respondents, and those outside of Africa. We suggest that any policy development on African trophy hunting be required to incorporate the views of all African stakeholders.

1. Introduction

Trophy hunting in sub-Saharan Africa is a legally sanctioned multi-million dollar industry that occurs in over 20 countries (Lindsey et al., 2007). Only Kenya maintains a full trophy hunting ban, and nations that imposed bans in the past, such as Botswana and Zambia, have subsequently lifted these (Blackie, 2019; Booth et al., 2020). One reason why full bans have been reversed is that trophy hunting provides benefits to people (Government of Botswana, 2018; Mbaiwa and Hambira, 2023). The societal benefits of hunting are varied, but fall broadly within the following four categories: 1) the provision of meat, 2) problem animal control, 3) the funding of wildlife conservation and 4) community development (Muposhi et al., 2016; Taylor, 1994; White and Belant, 2015). These provisions are central to the African trophy hunting debate, and so we summarise these here:

1.1. Provision of meat

Hunting concession holders may provide meat to neighbouring communities, either following a hunt, or through problem animal control (White and Belant, 2015). Meat provision is an important component of community outreach practiced by the hunting industry across southern Africa (Muyengwa, 2015; Naidoo et al., 2016), and the loss of meat supply for example, was a factor in community opposition to the past Botswana hunting ban (Gaodirelwe et al., 2020).

While meat provision is an important part of community outreach, little appears to have been done to explore alternate sources of protein for communities that neighbour hunting concessions (eg Jori et al.,

1995). Moreover, if full transparency in meat distribution is not followed, then community discontent may set in (Muyengwa, 2015). In Namibia for example, villagers complained that headmen tended to hoard meat allocations (from hunters), and that some households were excluded from meat allocation (Gargallo and Kalvelage, 2021).

1.2. Problem animal control

Subsistence farming is widely practiced across sub-Saharan Africa (You et al., 2009), and subsequent conflict between wildlife and people can lead to human injury or death, as well as negative mental health outcomes (Barua et al., 2013; Nyhus, 2016). Lethal control of problem animals is one form of direct mitigation available to wildlife management authorities (Hoare, 2015). Where problem animal control (PAC) is subcontracted to a hunting outfit, compensation may occur through the trophy fees paid (Taylor, 1994). Hunting clients are prepared to pay a premium for a problem animal (Lindsey et al., 2007), and there is evidence that this practice has reduced conflict (Lindsey et al., 2006). Although PAC through trophy hunting may occur, the practice is not widespread.

One issue with linking trophy hunting to PAC is that it may be open to abuse; claims of wildlife damage may be exaggerated (Lindsey et al., 2006), in order to derive trophy fees or meat from a problem animal. Moreover, the lethal removal of problem animals, such as crop raiding elephant does not stop conflict, as new animals may move into the region and take up raiding (Hoare, 2012).

1.3. Conservation and wildlife management

Trophy hunting provides the economic incentive required to justify wildlife conservation as a form of land use. A substantial amount of land in sub-Saharan Africa is set aside for trophy hunting (Lindsey et al., 2007; Muposhi et al., 2016; Naidoo et al., 2016), and hunting often occurs on remote or marginal land that photographic tourists are unlikely to visit (Baker, 1997). In southern Africa, hunting played an important role in the shift from pastoralism to wildlife conservation as a form of land use (Barnes and deJager, 1996; Child and Child, 2015; Cloete et al., 2007), with some benefit to wildlife abundance. The Zimbabwe wildlife industry for example, based on hunting and tourism on private land, oversaw a numerical quadrupling of wild animal populations (Bond et al., 2004).

Critics have indicated that land set aside for conservation (and hunting) imposes opportunity costs on rural people living nearby, who cannot use that land for cropping or pastoralism (Muposhi et al., 2016). Moreover, the funds generated by trophy hunting may fall short of the substantial costs required to fund effective conservation in Africa (Lindsey et al., 2016).

Biologists too have expressed concerns about the excesses of the African hunting industry. Trophy hunting, for example precipitated the rapid decline of some lion (*Panthera leo*) populations in East Africa (Packer et al., 2011), and unregulated hunting has disrupted the age-sex structure of lions in Hwange National Park, Zimbabwe (Loveridge et al., 2007). Moreover, unregulated trophy hunting may drive unnatural selection in targeted species (Festa-Bianchet and Mysterud, 2018).

1.4. Community development

Trophy hunting has contributed to the success of community conservation schemes across Africa (Lewis et al., 1990; Usongo and Nkanje, 2004; Zingi et al., 2022). This may occur where hunting revenues are distributed among households and directed toward social development projects (Frost and Bond, 2008). The devolution of decision-making, which is a typical component of community conservation, has empowered otherwise marginalised people who are then more likely to utilise their resources sustainably (Child, 1996; Murphree, 2009). Community based conservation has to some extent addressed historic conservation

injustices (Muboko, 2021), and facilitates a human centred approach toward wildlife management that reflects African views and rights (eg Madzwamuse et al., 2020).

Critics of the role of hunting in community conservation indicate that funds may not reach all people (Mutandwa and Gadzirayi, 2007), or may not be equitably allocated (Thomsen et al., 2022). There may also be a perception among communities that trophy hunting facilitates foreign extraction of natural resources, in particular where local people are not permitted to hunt themselves (Balakrishnan and Ndhlovu, 1992). Further concerns have been raised about the viability of trophy hunting as a principal source of revenue for community based conservation, for example where governance or local capacity is weak (Muposhi et al., 2016).

In practical terms, the benefits of trophy hunting are those typical of a wildlife economy, where natural resources are utilised sustainably. Such an utilitarian approach toward wildlife conservation may be acceptable to many people in southern Africa (see Madzwamuse et al., 2020). Where hunting occurs in Africa, field based surveys show that rural residents may accept the practice where this contributes to community improvements (Mokgalo and van der Merwe, 2022; Zafra-Calvo and Moreno-Penaranda, 2018), and the provision of meat (De Boer and Baquete, 1998). Trophy hunting as a form of problem animal control has also been indicated positively in surveys of rural communities (Mbaiwa, 2018), and wildlife conservation is viewed more positively among communities that benefit from hunting (Stormer et al., 2019). Notably, negative perceptions of trophy hunting have been expressed by rural people that receive little benefit from the activity (Balakrishnan and Ndhlovu, 1992).

While the perceptions of many African communities toward the benefits of trophy hunting have been documented (Angula et al., 2018; Mutandwa and Gadzirayi, 2007; Thomsen et al., 2022), such perceptions are less known among people that reside globally. Here, we were interested to know how people differed in their views around the justification for hunting, specifically focusing on situations where trophy hunting plays a societal role (in meat provision, conservation, community development and problem animal control). We postulated that people familiar with hunting as a practice would be sympathetic to the benefits of the industry. We further postulated that people with a more ambivalent attitude would tend to believe trophy hunting was justified only under specific circumstances. We therefore aimed to determine support for the societal benefits of hunting, and whether this varied across demographic groups, or regions.

2. Methods

2.1. Online survey

To estimate the attitudes of respondents toward trophy hunting in Africa, and the scenarios under which hunting was justified, we designed an international online survey. We presented each respondent with four scenarios and asked them to indicate whether they considered trophy hunting to be acceptable, or not for each scenario. Their response was measured as a binary yes or no. The scenarios were: 1) the provision of meat to neighbouring communities, 2) problem animal control, 3) contribution toward community development such as building of schools and clinics, 4) contribution toward conservation and wildlife management, 5) none (of the above). Respondents could choose any one, or all of the first four options. Or alternatively, they could just select the 5th option. Selection of the first four scenarios was recorded as a positive response ('yes') for each respective scenario chosen, while a negative 'no' response was recorded for scenarios that were not selected.

Survey respondents were also asked to indicate their support for, or opposition to trophy hunting, based on a 1–5 Likert scale. A score of 1 indicated 'do not support trophy hunting', while a score of 5 was 'support trophy hunting'. In the Results section, we refer to this as 'trophy hunting view'.

Further, we collected data on geographic location, demography (age, ethnic group and gender), educational attainment, and employment/affiliation with the wildlife conservation sector. Location was at the continental scale (Africa, Europe etc), and ethnic groups definitions were those used by the United Kingdom Office of National Statistics (https://ons.gov.uk). Age was categorised by decade (6 categories, 20–29, 30–39 and so on to age 70+), and educational attainment was classed as School, Trade, Undergraduate and then Postgraduate degree.

The free online platform *Google Forms* was used to collect survey data. The survey was anonymous, as we did not request user information, and *Google Forms* does not collect data that can identify respondents. The online introduction to the survey explained to respondents that the questionnaire pertained only to sub-Saharan Africa, and only to the legal hunting of large mammals for trophies. Consent was assumed given that all respondents had the choice to take the survey, or not. All authors sent requests for responses through email and social media platforms, leveraging their global networks. We encouraged all survey recipients to circulate the survey further themselves, through their own networks. This was done to mitigate possible bias inherent to the networks of the authors. Because we could not account for self-selection bias we exercise caution in the interpretation of our findings. We make no inference on the proportions of respondents who expressed views for or against trophy hunting, or the benefits of hunting.

Details of the University faculties, Government departments, and private and non-profit organisations targeted are listed in the Supplementary information. Flyers, which linked to the survey via a QR code were also posted in public (see Supplementary information). The survey was in English only and required online access to respond. We recognise that this may have excluded respondents whose English was poor, and rural people with limited online access.

Responses were received from 5755 individuals, but we omitted 38 of these as they were incomplete. For the correspondence analysis (see below), we omitted gender non-binary respondents as the sample was small ($n = 22$). Further details of the survey are provided in the Supplementary information. Human ethics clearance was through Liverpool John Moores University in the United Kingdom (number 18/NSP/072).

2.2. Multiple correspondence analysis

The survey data were analysed using Multiple Correspondence Analysis (MCA), which represents a correspondence analysis of an individual×variable indicator matrix, where each variable is a binary variable that codes a given response to one of the questions. An accessible explanation of the method is provided by le Roux and Rouanet (2010). The MCA was computed using the R packages FactoMineR, together with Factoshiny and Factoextra (Lê et al., 2008).

Similar to related methods, such as Principal Components Analysis (which assumes continuous variables), MCA can reduce the complexity of large datasets (of categorical variables) by summarising the set of variables using a smaller number of orthogonal axes. Axes are obtained using singular value decomposition of the matrix of standardised residuals from the indicator matrix. Supplementary variables that do not contribute to these axes can subsequently be added to the MCA, allowing investigation of their relationships with the original ('active') variables.

We were interested in the relationships between individual (yes/no) responses for the four trophy hunting justification scenarios (the active variables in the analysis), and respondent supplementary variables. These were: respondent geographic location, educational attainment, demography (age, ethnic group and gender), and conservation background (respondent employment in the field of conservation or wildlife management, or family members employed in those fields). Categories within some of the supplementary variables were grouped prior to analysis in order to simplify interpretation. We pooled the four age groups above 40 as one class ('40+'), as we found that these age groups provided similar responses (see Supplementary Fig. S1). For geographic

location, respondent sample sizes were not substantial for South America, Asia and Australasia (Supplementary Fig. S1), so we pooled these as 'Rest of World', but the other respondent location categories were maintained (i.e., Africa, Europe and North America). Ethnic groups were pooled into categories People of Colour (PoC) and White, although we provide MCA results for all ethnic groups in Supplementary Fig. S1. For educational attainment, we pooled data where respondents selected 'high school' or 'trade' as highest attainment. 'Trade' here represents training in vocational skills, such as would be required for employment in the construction industry, as an example.

We included respondents' overall trophy hunting view (THV) scores on a Likert scale as supplementary variables in order to examine the association between the overall strength of support for trophy hunting and the four justification scenarios. The extremes of our Likert scale corresponded to 'do not support trophy hunting' (1) and 'support trophy hunting' (5) and the central value was 'neutral' (3).

3. Results

3.1. Response summary

Most respondents considered trophy hunting to be justified under one, or more scenarios. Of all responses, 84 % ($n = 4812$) considered trophy hunting acceptable where this contributed toward conservation, 71 % ($n = 4042$) considered hunting acceptable where the practice resolved conflict through problem animal control, 68 % ($n = 3899$) were similarly positive where hunting contributed toward community development, and 65 % ($n = 3747$) considered hunting justified where this provided meat to communities.

Of all responses, 11 % ($n = 623$) of respondents did not consider hunting to be acceptable under any given scenario, i.e., they selected 'none of the above' to the question on justification for hunting. Of all respondents from Europe, 28 % ($n = 347$) did not consider hunting to be justified, compared to 6 % ($n = 179$) of respondents from Africa, and 5 % ($n = 60$) of respondents from North America. Of all female respondents, 29 % ($n = 379$) did not accept any justification for hunting, while around 5 % ($n = 239$) of males thought similarly. Of note, 52 % ($n = 2960$) of all respondents had a conservation background.

3.2. Multiple correspondence analysis

The MCA condensed 68.5 % of the variation into component 1 and 14.3 % into component 2, allowing the majority of the variance in hunting justification responses to be represented on just two axes. The correlation between the active variables (hunting justification) and the first two components, or dimensions, is shown in Fig. 1 along with supplementary variables (Table 1). Responses to all four justification scenarios were distinguished on component 1 ('no' corresponded to positive component scores and 'yes' to negative scores). Nonetheless, the wildlife management/conservation scenario was divergent from the other three corresponding yes/no responses which clustered quite tightly, most notably for the 'no' response. This indicated that a negative, or null response to the wildlife management/conservation justification scenario was distinctly less frequent than negative responses to the other three scenarios and vice-versa.

The supplementary categories associated with 'yes' for wildlife management/conservation were: African location and being male (Fig. 2) and having professional training or a trade (Supplementary Fig. S1). The supplementary category most strongly associated with 'yes' for the other three scenarios (i.e., problem animal control, community development and meat for poor communities) was North American location. Being over 40 led to a greater association with 'yes' responses to all four scenarios. Characteristics that did not deviate significantly from the barycentre of observations, indicating no association, were postgraduate education and age 30–40 (Fig. 2 and Supplementary Fig. S1).
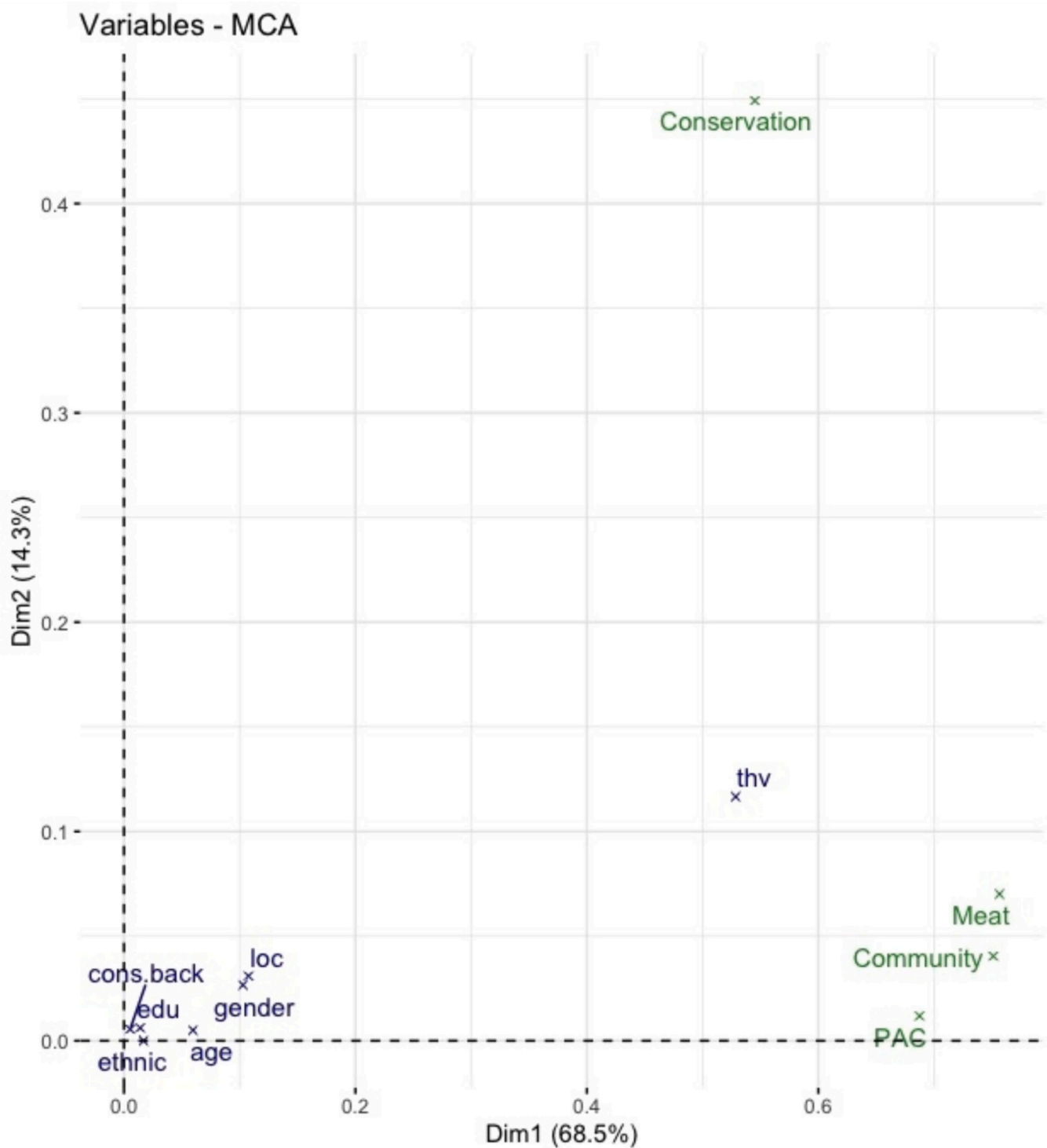
Fig. 1. MCA biplot for the 1st and 2nd dimensions (Dim1 and Dim2), representing 82.8 % of the variation. Rows (respondent attributes: supplementary variables) are shown in blue: location (loc), gender, age, ethnicity (ethnic), conservation background (cons.back), trophy hunting view (thv). Columns (representing the responses selected by each respondent) are indicated in green: conservation (Conservation), meat supply (Meat), community development (Community) and problem animal control (PAC). Distances between row and column points represent their similarity. Hence, trophy hunting view (for, neutral, or against hunting) is highly associated with the different scenarios under which trophy hunting was considered acceptable by the respondent. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

The four justification scenarios were closely related to Likert scale scores for trophy hunting view (Fig. 2 and Supplementary Fig. S1). Respondents who strongly disagreed with trophy hunting did not accept any of the justification scenarios (Fig. 2). In contrast, those who were neutral about trophy hunting were willing to accept wildlife management/conservation as the only provision under which it was acceptable. Respondents who were fully supportive of trophy hunting were likely to support all justification scenarios (Fig. 2 and Supplementary Fig. S1).

Plots of individual component scores provided very small confidence

Table 1
Discriminant measures, or contributions made by supplementary variables to the dimensions, for the first 3 dimensions. Higher scores indicate higher relative contributions.

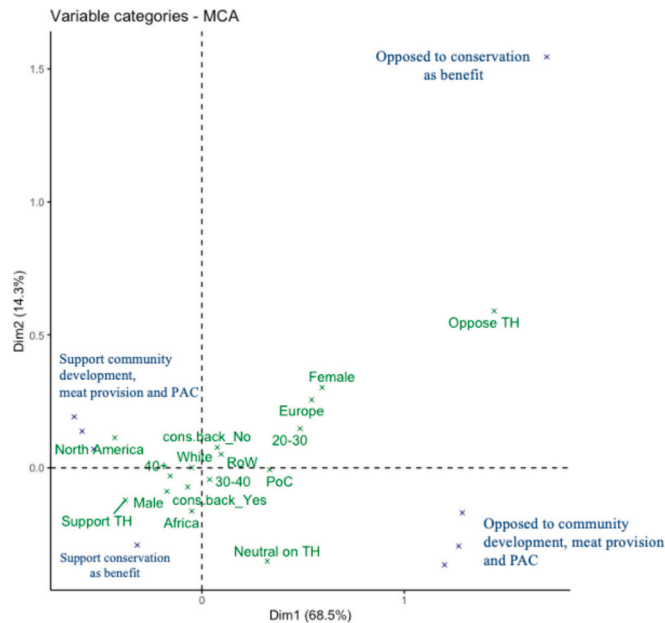| Dimension variance	69 %	14 %	10 %
Variable	Dimension 1	Dimension 2	Dimension 3
Age	0.060	0.005	0.001
Gender	0.103	0.027	0.001
Geographic location	0.108	0.031	0.004
Ethnic group	0.017	0.000	0.001
Educational attainment	0.012	0.006	0.000
Conservation background	0.005	0.005	0.010
Trophy hunting view	0.529	0.117	0.016

Fig. 2. Plot of the coordinates of variable categories on the 1st and 2nd dimensions (Dim1 and Dim2). Variables with a similar profile are grouped together while negatively associated variables show contrasting negative/positive axis values. The overall trophy hunting view responses are displayed in green font but where 5 choices are pooled as 3, and where text is shown to replace scores (Oppose TH = Likert score 1, 'strongly oppose trophy hunting'). A MCA plot of all Likert scale choices is provided in the Supplementary material. The responses to potential hunting justification scenarios (conservation, meat supply, community development and problem animal control) are indicated in blue text. Detailed labels for these scenarios are provided in the Supplementary material. RoW is 'Rest of World' and PoC is 'People of colour'. Educational attainment can be seen in the Supplementary material. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

ellipses around mean locations of 'yes' and 'no' responses for each of the four scenarios (Fig. 3). Significantly, these plots clearly showed how individual 'yes'/'no' responses to the wildlife management/conservation scenario were perfectly correlated with corresponding 'yes'/'no' responses for the other three scenarios. This indicated that respondents who indicated 'yes' to these three scenarios also indicated 'yes' to the wildlife management/conservation scenario.

4. Discussion

Some of the contestation around trophy hunting in Africa has centred on the contribution that hunters make to broader African society, such as the funding of wildlife conservation, or of community development schemes. Arguments that promote successful case studies of
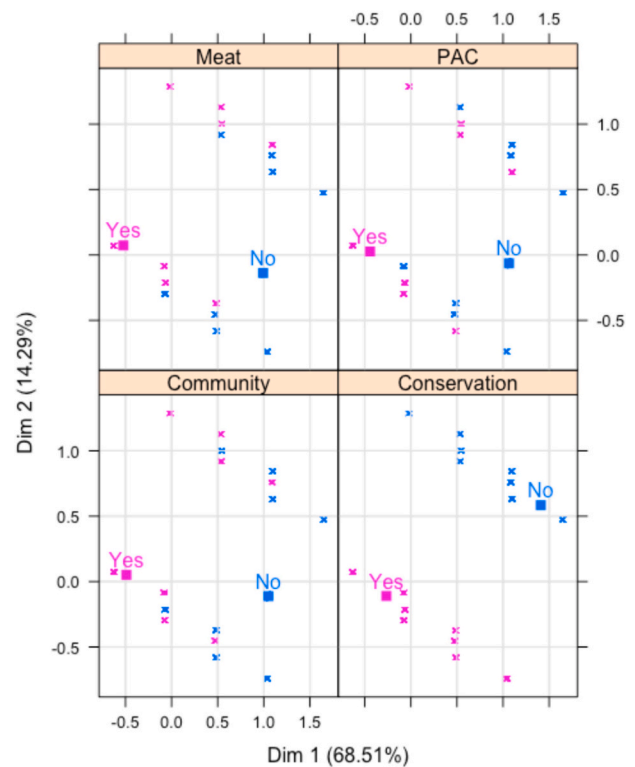

Fig. 3. The 99.9 % confidence ellipses around the means of the two different responses to each of the four justification scenarios. Ellipses are less obvious here because the sample size is large.

conservation, or community empowerment through trophy hunting, are quickly countered (see responses to Dickman et al., 2019), and it may be that objections to the benefits of trophy hunting are simply an objection to hunting itself. Our data suggest that an individual's supportive or repudiative stance toward hunting in Africa will likely determine their position on the benefits of trophy hunting. Moreover, our survey points to a cohort of people that did not consider the benefits of hunting in Africa to be acceptable under any circumstance, even where the practice contributes to conservation or community development. It does appear that that cohort is mostly Europe-based, and this may be of concern if African conservation decision makers are side-lined in policy development (see Chaukura et al., 2019).

Despite these entrenched positions, there was convergence of support for wildlife conservation as a justification for hunting, notably where respondents were neutral in their support for trophy hunting per se. Conservation and wildlife management was the single justification that separated the majority of respondents (with a range of views from mild disagreement to strong support), from a minority that were strongly opposed to hunting in Africa and would not countenance even conservation as a justification (Fig. 2). The contribution that hunting makes to the African conservation effort may therefore be an optimal area of compromise within such a contested debate. There is evidence of the positive role played by hunting in wildlife conservation in Africa (Lindsey et al., 2013; Strampelli et al., 2022), and future policy could ensure that the hunting industry contributes directly to conservation through certification schemes (e.g. Wanger et al., 2017). Policymakers may find support from the hunting industry too: hunting clients themselves would like to see their fees directed toward conservation initiatives (Fischer et al., 2015; Lindsey et al., 2006).

The finding that conservation was the hunting justification with greatest support, was not entirely expected. For example, community development provisions are inherently concerned with human welfare and might also be perceived as a reasonable justification. A recent study

based on an online vignette experiment (Hare et al., 2024), similarly found that respondents were somewhat more supportive of scenarios where funds from hunting supported wildlife conservation, than where those funds were directed to economic development. Contrastingly, an online survey of conservation scholars' perspectives on the morality of trophy hunting (for the sake of conservation), found that concerns for local communities had the strongest effect on perceived acceptability of hunting (Ghasemi et al., 2023). That same survey found that the ecological outcomes of hunting also influenced perspectives on the morality of trophy hunting. Perhaps the conservation scholars surveyed by Ghasemi et al. (2023) were aware of the role of hunting in community based conservation. All of that said, in many instances in Africa, conservation and community development are integrated, in particular where trophy hunting occurs on communal owned concessions (Angula et al., 2018; Frost and Bond, 2008; Muposhi et al., 2016). The majority of respondents in our survey supported all justifications for hunting (Supplementary Table 1), and benefits such as community development were certainly not dismissed.

Of further interest, our survey showed that an individual's position on trophy hunting, and on the justification of hunting can be explained, in part by their geographic location, demographic group and conservation background. The role of location in personal attitudes toward trophy hunting may be based on cultural differences, with respondents based in Europe being less likely to support any benefits of African hunting, while the same was not true of respondents based in Africa (Fig. 2). Differences by location were notable across age groups and gender. For example, female respondents in Europe were associated with a lack of support for hunting, and rejected all justifications for hunting, but female respondents from Africa were relatively supportive of hunting and were more likely to support the justification of hunting than male respondents from Europe (Supplementary Table 2). Age mattered too, with young respondents (under 30) from Europe being less likely to support any justification of hunting than similar aged African respondents (Supplementary Table 2).

These differences may be cultural, although there are limits to what we can infer from our data. We note though a recent study on the public perceptions of African hunting, which found that British-based respondents were less supportive of trophy hunting than South African respondents (Hare et al., 2024). Studies on the media framing of African hunting have made similar observations. For example, an assessment of ten years of British newspaper coverage of African trophy hunting found the sentiment toward hunting to be broadly negative (Yeomans et al., 2022). And a review of the news coverage of the killing of 'Cecil the lion' in 2015, found the Zimbabwean media response to be more restrained than that of the British media (Somerville, 2017). More can perhaps be done to understand possible cultural differences in attitudes toward hunting in Africa.

Finally, we note the role played by 'proximity to conservation' in shaping views on hunting: respondents with a conservation background were relatively supportive of hunting and the societal role played by hunting. This may be because those respondents were familiar with the debate, or were themselves employed within the wildlife management industry, or knew people who were. It may be that Africa-based respondents are aware that the costs of conservation are borne locally (Green et al., 2018), and so sympathise with the industry.

We are cognisant that our survey was not random, neither in a social-economic or geographic sense. As we could not use probability sampling, we cannot subsequently infer that respondent views are proportional to the populations sampled. Nonetheless, our survey does shed some light on the factors that may drive divergent views on the societal benefits of African trophy hunting. Conservation decision-makers should allow for the possibility that an individual's place of origin and their demographic group may influence their opinions on both African trophy hunting as a practice, and the societal benefits provided by the industry.

At an international level, policymakers may find opportunities for

'common ground' where wildlife conservation is an outcome of trophy hunting in Africa. However, our online survey likely excluded rural African communities who lacked internet access, and those people will need to be included as stakeholders in any future policy on trophy hunting (see Chaukura et al., 2019). One way to address this may be through the democratisation of African conservation, which would by necessity emphasise the views of (majority) rural communities. An example of this was the Botswana Government's nationwide consultation with all communities following a 2014 blanket ban on hunting, which subsequently led to the lifting of the ban despite outside objection (Government of Botswana, 2018).

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CRediT authorship contribution statement

Lochran W. Traill: Writing – review & editing, Writing – original draft, Data curation, Conceptualization. **Thomas C. Wanger:** Writing – review & editing, Investigation, Conceptualization. **Wayne Twine:** Writing – review & editing, Methodology, Conceptualization. **Shaya van Houdt:** Writing – review & editing, Data curation, Conceptualization. **Richard P. Brown:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

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

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.biocon.2024.110689.

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