Are public opinions of trophy hunting, canned hunting and their impact on conservation in South Africa affected by knowledge levels?

Presented by

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Abstract

Trophy hunting is a highly debated issue globally, with opinions on the ethical, environmental and biological consequences being highly polarised. Whilst many studies focus on attitudes towards animals, only a limited number solely research hunting attitudes, with a significant lack of research on attitudes towards canned hunting and knowledge of the link between hunting and conservation. Human attitudes towards animals frequently influence animal welfare laws and policies, therefore it is important to establish public knowledge and whether it affects opinions of these issues. An online survey assessing knowledge and opinion of hunting, attitudes towards animals and demographics, such as sex and pet ownership was completed by 154 respondents. There was a significant linear relationship between both knowledge and opinion and attitudes towards animals and opinion. No significant difference was found in opinion between pet and non- pet owners. Average knowledge levels were low, indicating a lack of awareness of these issues. As bans of trophy hunting are becoming more frequently considered, more research into knowledge and the relationship between knowledge and opinion is needed. Results found provide a solid foundation for future research exploring factors influencing knowledge and opinion, such as media influence and country of residence.

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1. Introduction

Trophy hunting is the practice of recreational hunting of wild animals with the objective of collecting 'trophies' such as horns, tusks, teeth or skins, for display (Sheikh and Bermejo, 2019). Trophy hunting in South Africa is a multimillion-dollar industry, with an annual revenue of $200 million (Vucetich, et al., 2019; Sheikh and Bermejo, 2019). There are approximately 9000 private game ranches in South Africa, covering 16.8% of the land (Cousins, Sadler and Evans, 2008), with an estimated 86% of these ranches offering trophy hunting (Pienaar, et al., 2017). One branch of the hunting industry that is rapidly growing is canned hunting (Lindsey, et al., 2012). Whilst similar in end result, the processes of trophy hunting and canned hunting are quite different. Canned hunting primarily involves lions (*Panthera leo*), with 90% of all lions hunted in South Africa originating from canned hunting operations (Lindsey, Roulet and Romañach, 2007). Canned lions are bred on farms for the sole purpose of hunting, hunted in small enclosed areas and the hunter is usually assured a guaranteed kill (Lindsey, et al., 2012).

1.1 Debates Surrounding Trophy Hunting

Trophy hunting is a highly debated issue globally, with opinions on the ethical, environmental and biological consequences being highly polarised (Lindsey, et al., 2006). Proponents of trophy hunting state that it is beneficial to conservation as it incentivises land owners to maintain their land (Di Minin, Leader-Williams and Bradshaw, 2016), leading to greater protection for the species living there. Trophy hunting can generate revenues in locations that may be unsuitable for other forms of tourism, due to factors such as political instability (Lindsey, Romañach and Davies-Mostert, 2009). When carefully controlled, hunting revenues have also been found to support the recovery of endangered populations such as the white rhinoceros (*Ceratotherium simum*) in South Africa (Lindsey, et al., 2007), due to the low offtakes and high prices for these species, which can then be reinvested into

protecting and breeding them (Lindsey, Romañach and Davies-Mostert, 2009; Grimm, 2008).

However, critics of trophy hunting state it can lead to population declines (Child and Darimont, 2015) and is unethical on animal welfare grounds, as being hunted can cause extreme physical and mental stress to animals (Bateson and Bradshaw, 1997; Lindsey, et al., 2010). There are also biological issues with the selective hunting and breeding of animals with certain characteristics (Child and Darimont, 2015). This has led to a phenotypic change in a number of species globally, such as a significant decrease in horn size and body weight in bighorn trophy rams (*Ovis canadensis*) in North America (Coltman, et al., 2003). Declines in top-level predators, such as lions, have been found to negatively affect all trophic levels throughout an ecosystem (Child and Darimont, 2015). Documentation of how much money gets reinvested into conservation is also regarded as unreliable as there are indications of corruption and mismanagement (Sheikh and Bermejo, 2019). Hart (2015) estimates that 10- 15 % of profits are reinvested into conservation, whereas Pienaar, et al. (2017) found that South African game ranch owners reported between 2- 40% of their budgets were being reinvested.

Despite this debate, most sources concur that canned hunting has no conservation benefit, as the animals are not part of the wild population (Di Minin, Leader-Williams and Bradshaw, 2016). Genetic manipulation of canned lions to produce greater trophies or colour variants such as ‘white lions’, has the potential to negatively impact genetics of wild populations if they were ever introduced (Lindsey, et al., 2012). Some hunting organisations have publicly condemned canned hunting and refuse to admit canned lion trophies into their record books.

1.2 Attitudes Towards Animals

Attitudes towards animals can be influenced by many factors including: age, gender, education and experience of animals (Serpell, 2004). Men generally show less empathy towards animals and are more approving of animal use (Taylor and Signal, 2005); childhood pet keeping has been found to increase concern about animal welfare in adulthood (Paul and Serpell, 1993). Kellert (1984) found that the public generally had very limited animal knowledge within the United States. Animal activity groups had greater knowledge than the general public, with conservation-related organisation members scoring higher than both anti-hunters and hunters. Ljung, et al. (2012) found that, in the United States, men were more supportive of hunting than women. Previous research of hunting perceptions (Byrd, Lee and Olynk Widmar, 2017) found that pet ownership was also significantly correlated with disapproval of trophy hunting.

1.3 Aims of the current study

Human attitudes towards animals frequently influence animal welfare legislations (Borgi and Cirulli, 2016); following public outcry from the highly publicised shooting of “Cecil” the lion, 40 airlines announced bans on the transportation of trophies on their flights, and the import of canned lion trophies was banned within the United States (Carpenter and Konisky, 2019). With the United Kingdom government currently evaluating a potential ban on the import of trophies (DEFRA, 2019), it is important to establish public knowledge and opinion of these issues. Limited European research into hunting attitudes has been conducted (Ljung, et al., 2012), most research originates from the United States, where hunting is more frequently perceived as culturally significant and the highest number of trophies are imported (Byrd, Lee and Olynk Widmar, 2017).

Whilst many studies focus on attitudes towards animals, only a limited number solely research hunting attitudes, with a significant lack of research on attitudes towards canned hunting and knowledge of the link between hunting and conservation. This research will focus on the gap in the literature of public knowledge on trophy hunting and canned hunting, the impact they have on conservation in South Africa and whether knowledge levels affect opinion. It was expected that greater knowledge levels would result in stronger opinions both for and against trophy and canned hunting.

2. Materials and Methods

2.1 Participants

A 25-question online survey (see Appendix A) was distributed to the following social media groups: Facebook (Cat Lovers Club, The Conservation Imperative, Tourists Against Trophy Hunting, Survey Sharing 2019, Dissertation Survey Exchange) and Reddit (https://www.reddit.com/r/SampleSize/). Respondents were required to be at least 18 years of age. The social media pages were chosen to provide a representative population sample but also to include certain demographics, such as pet owners, and those aligned with conservation and hunting groups to provide comparisons with studies, such as Byrd, Lee and Olynk Widmar (2017) and Fischer, et al. (2013). A total sample of 154 respondents was obtained.

2.2 Procedure

Respondents were asked about demographics, including age, sex and country of residence, general attitudes towards animals, and their knowledge and perceptions of hunting, conservation and animal welfare. Respondents were asked their level of agreement on a 5-point Likert scale to a variety of statements relating to hunting, conservation and animal welfare; some of these statements having been previously tested in Byrd, Lee and Olynk Widmar (2007) and Stedman and Decker (1996). Statements were worded to include a

mixture of positively and negatively scored, ensuring participants were answering attentively. A brief version of the Animal Attitude Scale (AAS-5) (Herzog, Grayson and McCord, 2015) will be included, as it is one of the most commonly used measures of general attitudes towards animals.

2.3 Data Analysis

An overall knowledge score was established per respondent, by totalling their responses across the six knowledge-based questions. A maximum score of 15 was possible, with 15 representing high knowledge. Opinion score was calculated from totalling responses from the 10 Likert scale opinion questions, a maximum score of 50 was possible; where 50 represented strongly positive opinions of hunting and its impact on conservation. Definitions of trophy and canned hunting were provided for the opinion score questions but were absent during the knowledge questions. AAS-5 score was calculated by totalling responses to the five AAS-5 questions, with 25 being the maximum score and representing a more negative attitude towards animals.

Statistical analysis was performed using Genstat 19th edition. Simple linear regression was used to examine relationships between knowledge and opinion scores. Simple linear regression was also used to examine relationships between AAS-5 and opinion scores and a Mann- Whitney U test used to determine whether pet ownership significantly affected opinion score.

3. Results

3.1 Summary Statistics of Demographics

The mean age of respondents (*n* = 154) was 36 years, with the sample containing 67% (*n* = 103) female and 31% (*n* = 47) male respondents. Respondents were from 25 countries, with 38% (*n* = 59) residing within the United Kingdom, 29% (*n* = 45) from the United States of

America, 6% (*n* = 9) from South Africa, 6% (*n* = 9) from Canada, and 21% (*n*= 32) from the remaining 21 countries, with 6 or less respondents per country. Pet owners accounted for 88% (*n* = 135) of the sample, whilst only 12% (*n* = 19) were not pet owners. Only 17% (*n* = 28) had participated in hunting, whilst 50% (*n* = 77) had friends or family that had participated in hunting.

3.2 Summary Statistics of Knowledge and Opinion

Overall knowledge levels were fairly low with a mean score of 3.73 (± 2.96). Men had a mean score of 4.98 (± 3.37), whilst women had a lower mean score of 3.18 (± 2.63). Residents of South Africa had the highest knowledge of any country, with a mean score of 7.68 (± 2.83), residents of the United Kingdom scored the lowest with a mean score of 2.76 (± 2.30). Only 25% (*n* = 38) respondents were able to provide a correct definition of either trophy or canned hunting. 75% (*n* = 116) of respondents stated that they had seen examples of trophy or canned hunting in the media. Lions were the most frequently selected animal as one of the top 5 trophy hunting exports from South Africa to the USA, with 80% (*n* = 123) of respondents selecting lion.

The mean opinion score was 21.62 (± 3.37), men had a mean score of 27.83 (± 10.05), whilst women had a mean score of 19.11 (± 7.39). Table 1 provides a summary of the responses to these opinion questions**.** Residents of Canada had the lowest mean score of 17.11 (± 10.58), resident of South Africa had the highest mean score of 31 (± 11.79), and residents of the United Kingdom had a mean score of 18.19 (± 5.24).

Table 1. Percentage of overall agreement to the opinion statements provided in the survey. *Responses of strongly agree and somewhat agree were conflated, as were responses of 'strongly disagree' and 'disagree'. Responses of 'neither agree nor disagree' were not included in the summary.

	Agree*	**Disagree***
It is acceptable to hunt for food.	73% (*n* = 112)	20% (*n* = *36*)
It is acceptable to hunt for wildlife population control.	56% (*n* = 87)	34% (*n* = 52)
It is acceptable to hunt for sport.	18% (*n* = 28)	64% (*n* = 99)
It is acceptable to trophy hunt.	14% (*n* = 22)	80% (*n* = 123)
It is acceptable to participate in canned hunting.	4% (*n* = 6)	86% (*n* = 132)
Trophy hunting has a positive influence on wildlife conservation.	16% (*n* = 25)	69% (*n* = 107)
Canned hunting has a positive influence on wildlife conservation.	5% (*n* = 8)	74% (*n* = 114)
It is acceptable to hunt endangered species	7% (*n* =11)	89% (*n* = 137)
Hunting reduces animal welfare.	57% (*n* = 88)	29% (*n* = 45)
Canned and trophy hunting should be stopped, even if it means people will lose their livelihoods.	74% (*n* = 114)	19% (*n* = 29)

3.3 The relationship Between Knowledge and Opinion

There is evidence of a statistically significant linear relationship between knowledge scores and opinion ($F(1,152)=27.39$, $p<0.001$), as seen in Figure 1. A permutation test was conducted to confirm the accuracy of this, which produced a consistent result.

Opinion score increases by 1.217 per 1 unit increase in knowledge score [95% CI 0.76 to 1.68].

This linear relationship can be summarised by the following model;

Opinion score = 17.08 +1.217 * knowledge score

This model explains 14.7% of the variation in opinions score, indicating that knowledge is only a poor predictor of opinions on trophy hunting, canned hunting and their impact on conservation.

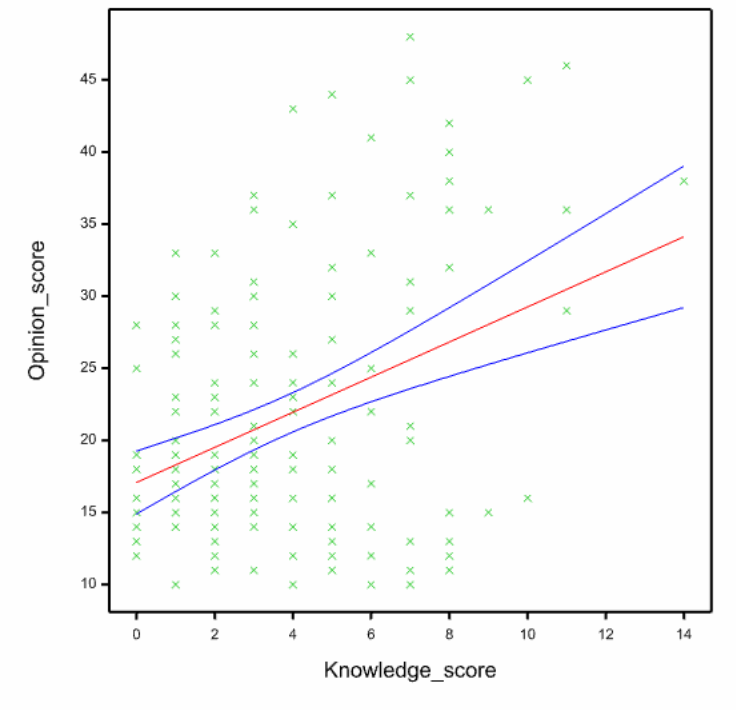


Figure 1. Fitted model showing the linear relationship knowledge and opinion scores. 95% CI also shown.

3.4 The Relationship Between Attitudes Towards Animals Scale (AAS-5) and Opinion

There is evidence of a statistically significant linear relationship between attitudes towards animals and opinion ($F(1,152)=183.27$, $p<0.001$), as seen in Figure 2. A permutation test was conducted to confirm the accuracy of this, which produced a consistent result.

Opinion score increases by 1.627 per 1 unit increase in knowledge score [95% CI 1.39 to 1.87].

This linear relationship can be summarised by the following model;

Opinion score = 4.42 +1.627 * attitudes towards animals (AAS-5) score

This model explains 54.4% of the variation in opinion score, indicating that attitudes towards animals score (AAS-5) is good predictor of opinions on trophy hunting, canned hunting and their impact on conservation.

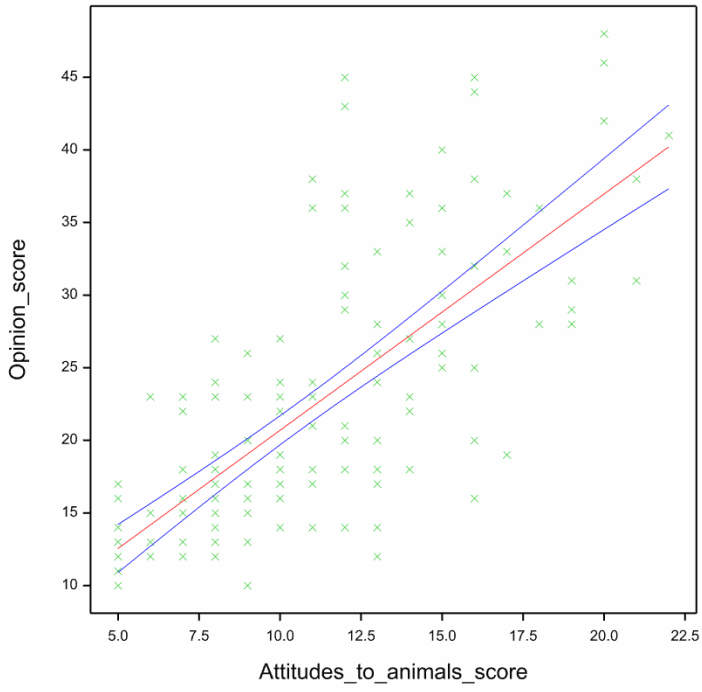


Figure 2. Fitted model showing the linear relationship knowledge and attitudes towards animals (AAS-5) score. 95% CI also shown.

3.5 The Effect of Pet Ownership

Although non pet owners had an average higher opinion score (median = 21 IQR = 12.5) than pet owners (median = 18, IQR = 12.75), there was no significant difference in opinion score between the two groups (U = 1126.5, p= 0.391).

4. Discussion

It was anticipated that knowledge levels would affect opinions of trophy hunting, canned hunting and the impact they have on conservation. There was evidence of a statistically significant linear relationship between knowledge and opinion; however, it was found that knowledge is only a poor predictor of opinion. As the sample size was fairly limited in comparison to similar research (Byrd, Lee and Olynk Widmar, 2017; Ljung, et al., 2012; Kellert, 1984), future research with a larger sample would be beneficial in exploring this relationship. Furthermore, whilst it was anticipated that those with higher knowledge levels would have stronger opinions both for and against, it was found that higher knowledge only led to more supportive views. Research has found that those with hunting experience or within social groups containing hunters are both more supportive of hunting and more knowledgeable about wildlife conservation benefits (Van de Pitte, 2003; Ljung, et al., 2012). This could be a possible explanation for the increase in knowledge equalling an increase in supportive opinions, as half of respondents reported having friends or family who have hunted, however further analysis would be needed to confirm this.

4.1 The Influence of Attitudes Towards Animals (AAS-5) on Opinions of Hunting

The AAS-5 was found to be a good predictor of opinions; with those who had higher scores, and therefore less favourable attitudes towards animals, being more supportive of hunting. Mkono (2019) states that the love and protection of animals is a key motivation often expressed by trophy hunting supporters; this is not concurrent with the results of the current study, as the higher AAS-5 scores represent less concern for the welfare of animals (Herzog, Betchart and Pittman, 1991).

4.2 Overall knowledge level of respondents

Although 75% of respondents stated that they had seen examples of trophy or canned hunting in the media, the average knowledge level across all respondents was low. This could indicate ineffectiveness of awareness campaigns, as a successful campaign should result in positive changes to not only attitude but also knowledge and awareness (Meng, Cooper and Sun, 2019). However, as knowledge is only a poor predictor of opinion, awareness campaigns alone may not have the capabilities to dramatically change opinion. This finding has the potential to benefit many organisations such as conservation charities, hunting groups and anti-hunting groups, as it is imperative that these organisations understand the effectiveness of their campaign in order to effectively allocate their often-limited funding (Duthie, et al., 2017).

The majority of respondents incorrectly identified lions as one of the top 5 species of 'trophies' imported into the United States of America (Sheikh and Bermejo, 2019), this could be due to their charismatic appeal (Ducarme, Luque and Courchamp, 2013). Kellert (1984) found that the public are frequently more aware and interested in issues involving charismatic species. For this reason, media reports and awareness campaigns frequently focus on charismatic species (Meng, Cooper and Sun, 2019). When provided with definitions, respondents were less supportive of canned hunting, however media reports frequently conflate canned and trophy hunting (Lindsey, et al., 2007; Byrd and Olynk Widmar, 2017), and rarely feature the conservation implications of either (Larson, et al., 2014) potentially influencing biased and confused opinions in the general public. Further research into the representation of canned and trophy hunting in the media is needed to fully analyse the extent of people's knowledge on the differences between trophy and canned hunting and the effect of this.

4.3 Possible Influences on Knowledge and Opinion

Amongst demographic groups, men had higher average knowledge and opinion scores than women. Previous research has found men are generally more supportive of hunting and animal use in general (Byrd, Lee and Olynk Widmar, 2017; Herzog, 2007). Men also typically make up a large percentage of hunters (Larson, et al., 2014). The sample in the current study was unbalanced with only 31% of respondents being male; it is plausible that the male respondents had a higher level of familiarity with hunting practices, possibly explaining higher knowledge and opinion levels, as similarly theorised in Byrd, Lee and Olynk Widmar, 2017.

Whilst previous research found that pet owners were less supportive of hunting (Byrd, Lee and Olynk Widmar, 2017; Daly and Morton, 2006), there was no significant difference in opinion between those with or without pets. However, as only 12% of the sample were not pet owners, the unbalanced group sizes may have affected the validity of this result.

Average knowledge scores varied across residents of different countries, with South African respondents having the highest score and respondents from the United Kingdom the lowest. With the United Kingdom currently considering banning the importation of hunting trophies (DEFRA, 2019), and a recent poll finding 86% of people would support this ban (Survation, 2019), it is important to establish whether these opinions reflect true knowledge on the potential negative consequences a ban could generate (Di Minin, Williams and Bradshaw, 2016). Hunting is also viewed very differently in terms of cultural significance around the world (Gunn, 2001), which could explain these differences, and makes it difficult to generalise the findings of the current study to any one population. Mkono (2019b) found that African views of trophy hunting were very different to western views, with western views more concerned about animal welfare than the economic and conservation advantages that trophy hunting may bring. The present study found that 74% of respondents agreed that

canned and trophy hunting should be stopped, even if it means people lose their livelihoods. Further research into knowledge and opinion differences between countries would provide interesting comparisons.

5. Conclusion

This study demonstrates a linear relationship between knowledge and opinions of trophy hunting, canned hunting and the impact they have on conservation, with higher knowledge appearing to increase support for hunting practices. However, as the sample size was small (n = 154) and contained respondents from 25 countries, the findings should not be generalised to any one country's population. Based on the results, future research of interest could include identifying potential influences on knowledge and opinion, such as country or media representation of canned and trophy hunting.

References

Apostol, L., Rebega, O. L. and Miclea, M., 2013. Psychological and Socio-demographic Predictors of Attitudes toward Animals. *Procedia - Social and Behavioral Sciences*, 78, pp. 521–525. doi:10.1016/j.sbspro.2013.04.343

Bateson, P. and Bradshaw, E. L., 1997. Physiological effects of hunting red deer (Cervus elaphus). *Proceedings of the Royal Society B: Biological Sciences*, 264 (1389), pp. 1707–1714. doi:10.1098/rspb.1997.0237

Borgi, M. and Cirulli, F., 2016. Pet Face: Mechanisms Underlying Human-Animal Relationships. *Frontiers in Psychology*, 7.

Byrd, E., Lee, J. G. and Olynk Widmar, N. J., 2017. Perceptions of Hunting and Hunters by U.S. Respondents. *Animals,* 7 (11), p. 83.

Carpenter, S. and Konisky, D., 2019. The killing of Cecil the Lion as an impetus for policy change. *Oryx, 53*(4), pp. 698-706. doi:10.1017/S0030605317001259

Child, K. R. and Darimont, C. T., 2015. Hunting for Trophies: Online Hunting Photographs Reveal Achievement Satisfaction with Large and Dangerous Prey. *Human Dimensions of Wildlife,* 20(6), pp. 531-541, DOI: 10.1080/10871209.2015.1046533

Coltman, D., O'Donoghue, P., Jorgenson, J., Hogg, J. T., Strobeck, C. and Festa-Bianchet, M., 2003. Undesirable evolutionary consequences of trophy hunting. *Nature,* 426, pp. 655–658. doi:10.1038/nature02177

Cousins, J. A., Sadler, J. P. and Evans, J., 2008. Exploring the role of private wildlife ranching as a conservation tool in South Africa: stakeholder perspectives. *Ecology and Society*, 13 (2).

Daly, B. and Morton, L. L., 2006. An investigation of human-animal interactions and empathy as related to pet preference, ownership, attachment, and attitudes in children, *Anthrozoös,* 19(2), pp. 113-127. doi.org/10.2752/089279306785593801

DEFRA, 2019. *Call for Evidence on the scale and impacts of the import and export of hunting trophies*. [online] Available at: https://consult.defra.gov.uk/wildlife-management/call-for-evidence-trophy-hunting/ [Accessed 13 December 2019].

Di Minin, E., Leader-Williams, N. and Bradshaw, C. J. A., 2016. Banning Trophy Hunting Will Exacerbate Biodiversity Loss. *Trends in Egology and Evolution*, 31 (2), pp. 99-102. Doi.org/10.1016/j.tree.2015.11.012

Ducarme, F., Luque, G. M. and Courchamp, F., 2013. What are “charismatic species” for conservation biologists? *BioSciences Master Reviews*.

Duthie, E., Veríssimo, D., Keane, A. and Knight, A. T., 2017. The effectiveness of celebrities in conservation marketing. *PLOS ONE,* 12(7). doi:10.1371/journal.pone.0180027

Fischer, A., Kereži, V., Arroyo, B., Mateos-Delibes, M., Tadie, D., Lowassa, A., Krange, O. and Skogen,K., 2013. (De)legitimising hunting – Discourses over the morality of hunting in Europe and eastern Africa. *Land Use Policy,* 32, pp. 261-270. https://doi.org/10.1016/j.landusepol.2012.11.002.

Grimm, U., 2008. Trophy Hunting for Endangered Species. In R. D. Baldus, G. R. Damm and K. Wollscheid, eds. 2008. *Best Practices in Sustainable Hunting – A Guide to Best Practices from Around the World.* Budakeszi: International Council for Game and Wildlife Conservation

Gunn, A. S., 2001. Environmental ethics and trophy hunting. *Ethics and the Environment*, 6, pp. 68–95.

Herzog, H. A., 2007. Gender Differences in Human–Animal Interactions: A Review. *Anthrozoös,* 20 (1), pp. 7–21. doi:10.2752/089279307780216687

Herzog, H. A., Betchart, N. S. and Pittman, R. B., 1991. Gender, Sex Role Orientation, and Attitudes toward Animals. *Anthrozoös,* 4(3), pp. 184–191. doi:10.2752/089279391787057170

Herzog, H., Grayson, S. and McCord, D., 2015. Brief Measures of the Animal Attitude Scale. *Anthrozoös,* 1, pp.145- 142.

Hart, A, 2015. Big Game Theory, BBC Radio 4. [podcast] September 2015. Available at: https://www.bbc.co.uk/sounds/play/b067x5w1 [Accessed 2nd October 2019].

Heberlein, T. and Willebrand, T., 1998. Attitudes toward hunting across time and continents: The United States and Sweden. *Game Wildlife.* 16.

Kirkwood, J. K. and Hubrecht, R., 2001. Animal Consciousness, Cognition and Welfare. *Animal Welfare*, 10 (1), pp. 5-17.

Kellert, S.R., 1984. American attitudes toward and knowledge of animals: An update. In M.W. Fox and L.D. Mickley, eds. 1985. *Advances in animal welfare science 1984/85*. Washington, DC: The Humane Society of the United States.

Larson, L. R., Stedman, R. C., Decker, D. J., Siemar, W. F. and Baumer, M. S., 2014. Exploring the Social Habitat for Hunting: Toward a Comprehensive Framework for Understanding Hunter Recruitment and Retention. *Human Dimensions of Wildlife*, 19, pp. 105-122. 10.1080/10871209.2014.850126.

Lindsey, P. A., Alexander, R. , Frank, L. G., Mathieson, A. and Romañach, S. S., 2006. Potential of trophy hunting to create incentives for wildlife conservation in Africa where alternative wildlife-based land uses may not be viable. *Animal Conservation*, 9, pp.283-291. doi:10.1111/j.1469-1795.2006.00034.x

Lindsey, P. A., Roulet, P. A. and Romañach, S. S., 2007. Economic and conservation significance of the trophy hunting industry in sub-Saharan Africa. *Biological Conservation*, 134 (4), pp. 455- 469.

Lindsey, P. A., Frank, L. G., Alexander, R., Mathieson, A. and Romañach, S. S., 2007. Trophy Hunting and Conservation in Africa: Problems and One Potential Solution. *Conservation Biology*, 21(3), pp. 880–883. doi:10.1111/j.1523-1739.2006.00594.x

Lindsey, P.A., Romañach, S.S. and Davies-Mostert, H.T., 2009. The importance of conservancies for enhancing the value of game ranch land for large mammal conservation in southern Africa. *Journal of Zoology*, 277, pp. 99-105. doi:10.1111/j.1469-7998.2008.00529.x

Lindsey, P., Alexander, R., Balme,G., Midlane, N. and Craig, J., 2012. Possible Relationships between the South African Captive-Bred Lion Hunting Industry and the Hunting and Conservation of Lions Elsewhere in Africa. *African Journal of Wildlife Research*, 42(1), pp. 11-22.

Ljung, P. E., Riley, S. J., Heberlein, T. A. and Ericsson, G., 2012. Eat prey and love: Game-meat consumption and attitudes toward hunting. *Wildlife Society Bulletin,* 36(4), pp. 669–675.

McCubbin, S. G., 2019. The Cecil Moment: Celebrity environmentalism, Nature 2.0, and the cultural politics of lion trophy hunting. *Geoforum.* doi:10.1016/j.geoforum.2019.10.015

Meng, J., Cooper, E. and Sun, Y., 2019. Experiments on the effectiveness of marketing communications tactics to support 'unappealing' animals. *48th EMAC Annual Conference*, Hamburg, Germany, May 28-31st.

Mkono, M., 2019a. Neo-colonialism and greed: Africans' views on trophy hunting in social media, *Journal of Sustainable Tourism,* 27:5, pp. 689-704, DOI: 10.1080/09669582.2019.1604719

Mkono, M., 2019b. The Trophy Hunting Controversy. In M. Mkono, ed. 2019. *Positive Tourism in Africa.* London: Routledge

Paul, E. S. and Serpell, J. A., 1993. Childhood pet keeping and humane attitudes in young adulthood. *Animal Welfare,* 2(4), pp. 321–337.

Pienaar, E. F., Rubino, E. C., Saayman, M. and van der Merwe, P., 2017. Attaining sustainable use on private game ranching lands in South Africa. *Land Use Policy,* 65, pp. 176–185.

Radder, L., & Bech-Larsen, T., 2008. Hunters' Motivations and Values: A South African Perspective. *Human Dimensions of Wildlife,* 13(4), 252–262. doi:10.1080/10871200801986739

Serpell, J. A., 2004. Factors influencing human attitudes to animals and their welfare. *Animal Welfare,* 13, pp.145- 151.

Sheikh, P. A. and Bermejo, L. F., 2019. *International Trophy Hunting*. Washington, D.C: Congressional Research Service.

Stedman, R. C. and Decker, D. J., 1996. Illuminating an overlooked hunting stakeholder group: Nonhunters and their interest in hunting. *Human Dimensions of Wildlife*, 1, pp.29 -41.

Survation, 2019. *Campaign to Ban Trophy Hunting – September 2019*. [online] Available through: https://www.survation.com/wp-content/uploads/2019/10/Ban-Trophy-Hunting-Tables.xlsx [Accessed 13 December 2019].

Taylor, N. and Signal, T. D., 2005. Empathy and attitudes to animals. *Anthrozoös.* 18 (1), pp.18-27.

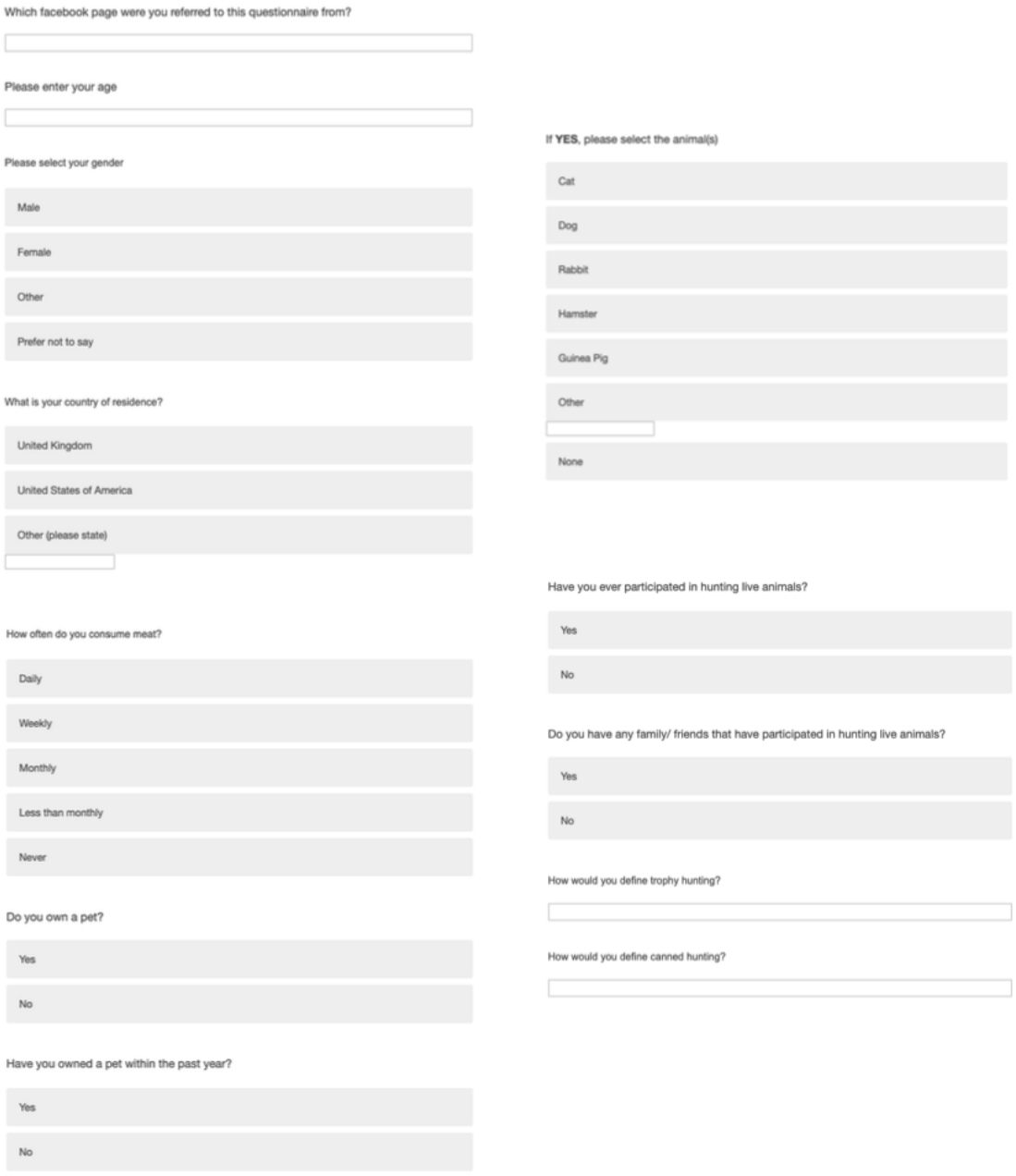
Van de Pitte, M., 2003. The moral basis for public policy encouraging sport hunting. *Journal of Social Philosophy*, 34, pp.256–266.

Vucetich, J. A., Burnham, D., Johnson, P. J., Loveridge, A. J., Nelson, M. P., Bruskotter, J. T. and Macdonald, D. W., 2019. The value of argument analysis for understanding ethical considerations pertaining to trophy hunting and lion conservation. *Biological Conservation,* 235, pp. 260- 272.

Williams V. L. and 'T Sas-Rolfes, M. J., 2019. Born captive: A survey of the lion breeding, keeping and hunting industries in South Africa. *PLoS ONE* , 14 (5).https://doi.org/10.1371/journal. pone.0217409

Appendices

Appendix A – Survey



Please select the extent to which you agree to the following statements

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
It is morally wrong to hunt wild animals just for sport.	O	O	O	O	O
I do not think that there is anything wrong with using animals in medical research	O	O	O	O	O
I think it is perfectly acceptable for cattle and hogs to be raised for human consumption	O	O	O	O	O
The slaughter of whales and dolphins should be immediately stopped even if it means some people will be put out of work.	O	O	O	O	O
I sometimes get upset when I see wild animals in cages at zoos	O	O	O	O	O

Please select the extent to which you agree to the following statements (please refer to the definitions of trophy/ canned hunting below if you are unsure)

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
It is acceptable to hunt for food	O	O	O	O	O
It is acceptable to hunt for wildlife population control	O	O	O	O	O
It is acceptable to hunt for sport	O	O	O	O	O
It is acceptable to trophy hunt	O	O	O	O	O
It is acceptable to participate in canned hunting	O	O	O	O	O
Canned hunting is more sustainable than trophy hunting	O	O	O	O	O
Trophy hunting has a positive influence on wildlife conservation	O	O	O	O	O
Canned hunting has a positive influence on wildlife conservation	O	O	O	O	O
It is acceptable to hunt endangered species	O	O	O	O	O
Hunting reduces animal welfare	O	O	O	O	O
Canned and trophy hunting should be stopped, even if it means people will lose their livelihoods	O	O	O	O	O
I would go on a holiday excursion that offered lion cub petting or walking with lions	O	O	O	O	O

Trophy hunting
"the killing of animals for recreation with the purpose of collecting trophies such as horns, antlers, skulls, skins, tusks, or teeth for display" (Pervaze and Bermejo, 2019).

Canned hunting
"[animals] are bred and raised in captivity and kept in confined enclosures until shot, to ensure that hunters are guaranteed a kill" (Di Minin, Leader-Williams and Bradshaw, 2016).

How would you rate your knowledge of animal welfare?

- Very good
- Good
- Neutral
- Poor
- Very poor

How would you rate your knowledge of trophy hunting?

- Very good
- Good
- Neutral
- Poor
- Very poor

Which species do you think are the top 5 trophy species imported into the USA from Africa? (please select 5)

Lion	Cheetah	Vervet Monkey
Giraffe	Greater kudu	Warthog
Wildebeest	Buffalo	Elephant
Zebra	Leopard	Impala
Gemsbok	Rhinoceros	

Please select all of the endangered species from the following

Cheetah	Black rhinoceros	Pangolin
Lion	African elephant	Sable antelope
Tiger	Giraffe	Leopard
Southern white rhinoceros	Plains zebra	Vervet monkey

The Animal Welfare Act 2006 sets out five basic animal needs of all animals; can you name any of these needs?

What do you think someone's motivation to participate in trophy or canned hunting is?

How much money do you think trophy hunting generated in South Africa in 2018?

$10 million	$250 million
$50 million	$300 million
$100 million	$350 million
$150 million	$400 million
$200 million	

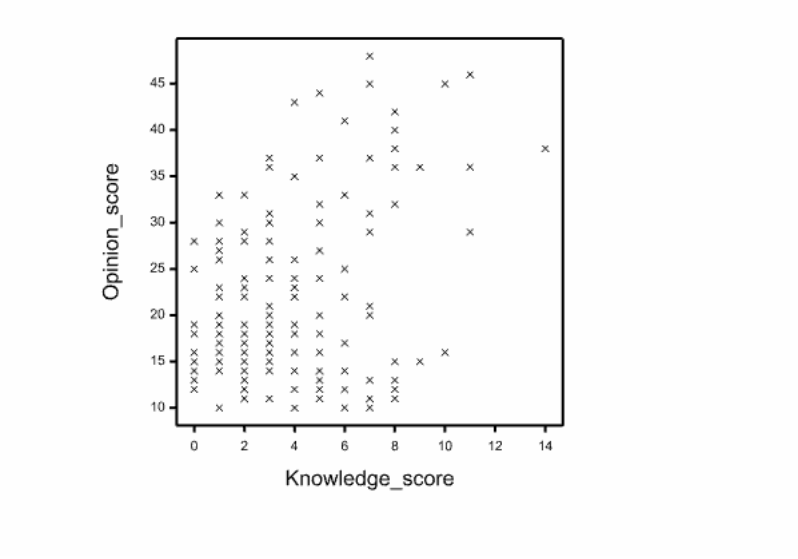
Have you seen any examples of trophy hunting or canned hunting in the media?

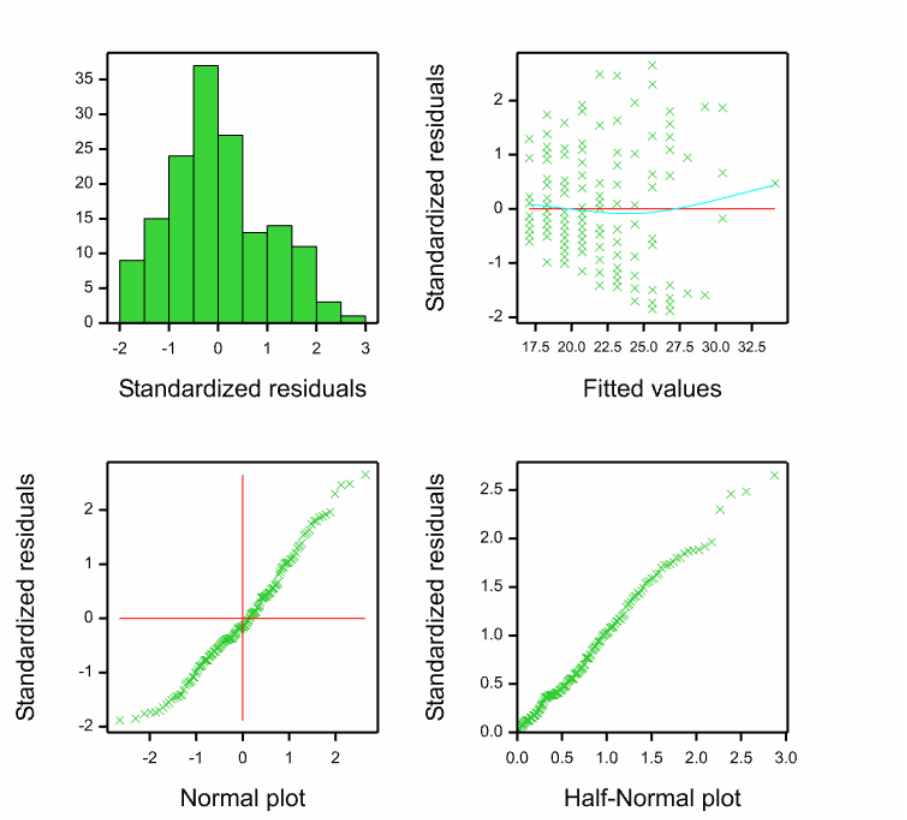
- Yes
- No
- Not sure

If **YES** please state, what you saw and where

Appendix B – Genstat Outputs

B1 –Simple linear regression of relationship between knowledge and opinion





Regression analysis

Response variate: Opinion_score
Fitted terms: Constant, Knowledge_score

Summary of analysis

Source	d.f.	s.s.	m.s.	v.r.	F pr.
Regression	1	1980.	1980.18	27.39	<.001
Residual	152	10990.	72.30		
Total	153	12970.	84.77		

Percentage variance accounted for 14.7
Standard error of observations is estimated to be 8.50.

Message: the error variance does not appear to be constant: intermediate responses are more variable than small or large respor

Message: the following units have high leverage.

Unit	Response	Leverage
74	29.00	0.046
103	16.00	0.036
105	36.00	0.046
111	45.00	0.036
115	46.00	0.046
117	38.00	0.085
118	38.00	0.085

Estimates of parameters

Parameter	estimate	s.e.	t(152)	t pr.
Constant	17.08	1.11	15.44	<.001
Knowledge_score	1.217	0.233	5.23	<.001

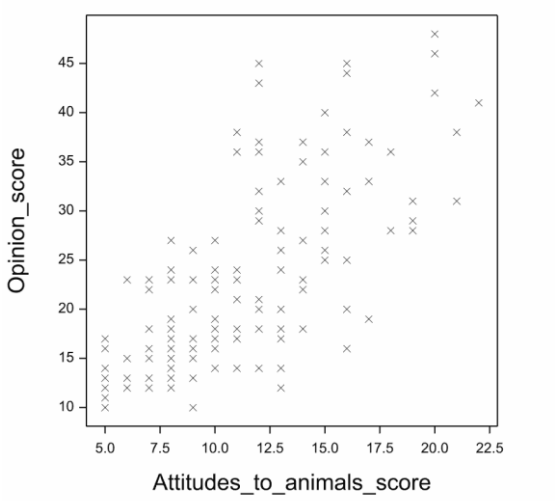
Parameter	lower95%	upper95%
Constant	14.89	19.26
Knowledge_score	0.7578	1.677

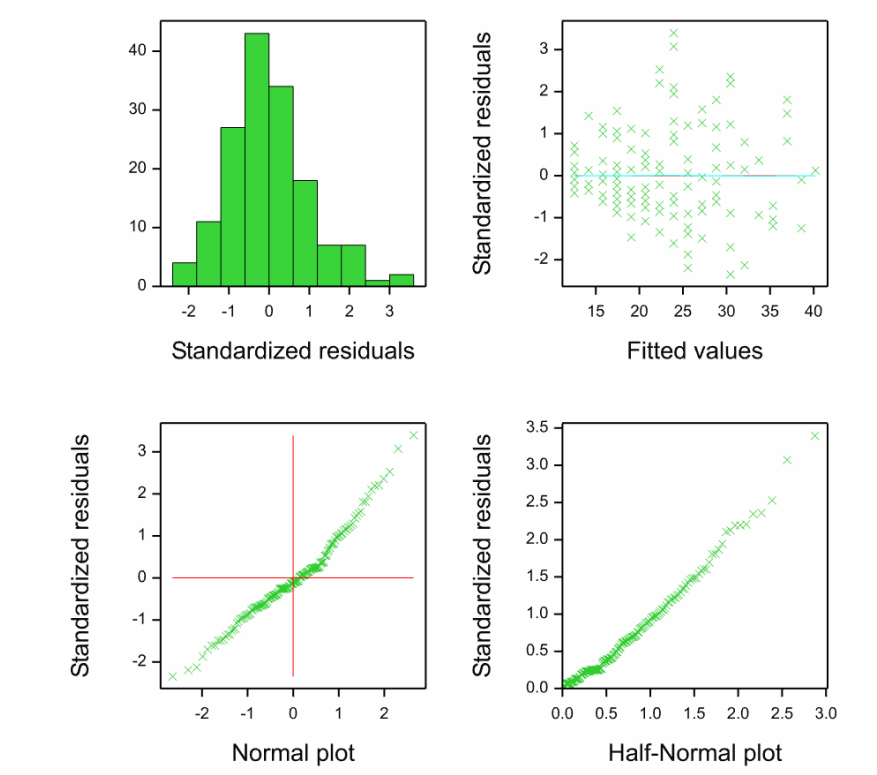
Summary of analysis

Variate: Opinion_score
Probability determined from 4999 random permutations

Source	d.f.	s.s.	m.s.	v.r.	prob.
Regression	1	1980.18	1980.184	27.39	<.001
Residual	152	10989.97	72.302		
Total	153	12970.16	84.772		

B2 – simple linear regression of relationship between AAS-5 and opinion





Regression analysis

Response variate: Opinion_score
Fitted terms: Constant, Attitudes_to_animals_score

Summary of analysis

Source	d.f.	s.s.	m.s.	v.r.	F pr.
Regression	1	7090.	7089.89	183.27	<.001
Residual	152	5880.	38.69		
Total	153	12970.	84.77		

Percentage variance accounted for 54.4
Standard error of observations is estimated to be 6.22.

Message: the following units have large standardized residuals.

Unit	Response	Residual
47	43.00	3.07
77	45.00	3.40

Message: the error variance does not appear to be constant; large responses are more variable than small responses.

Message: the following units have high leverage.

Unit	Response	Leverage
21	41.00	0.055
33	31.00	0.047
60	42.00	0.040
109	48.00	0.040
115	46.00	0.040
124	38.00	0.047

Estimates of parameters

Parameter	estimate	s.e.	t(152)	t pr.
Constant	4.42	1.37	3.24	0.001
Attitudes_to_animals_score	1.627	0.120	13.54	<.001

Parameter	lower95%	upper95%
Constant	1.723	7.120
Attitudes_to_animals_score	1.390	1.865

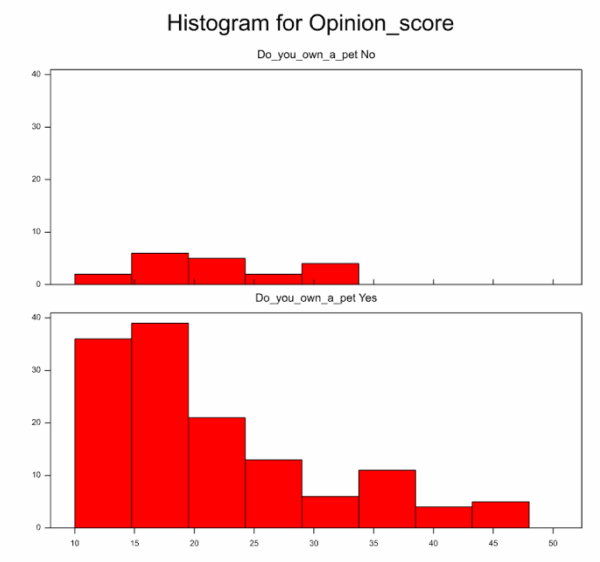
Probability for model <.001 (determined from 4999 random permutations)

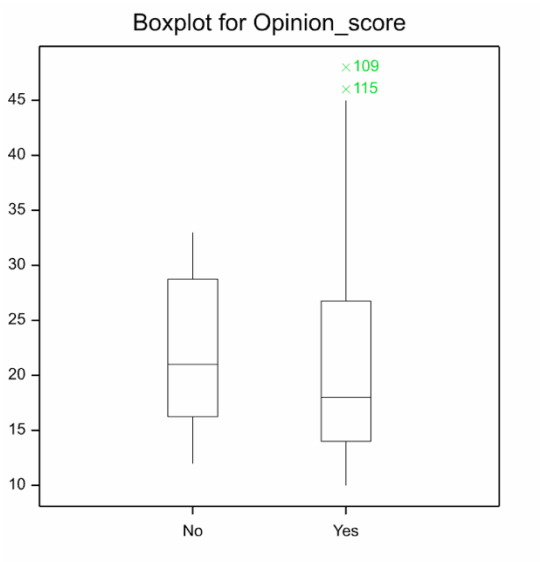
Summary of analysis

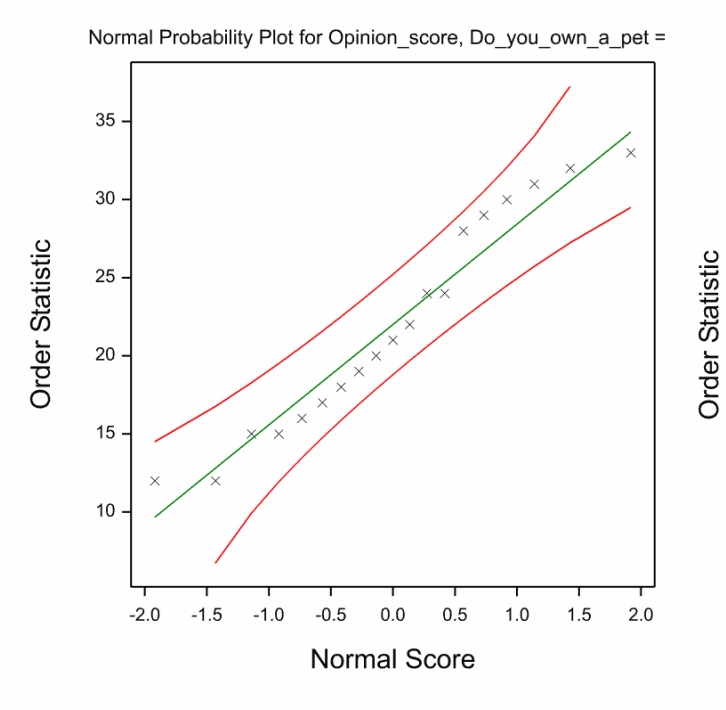
Variate: Opinion_score
Probability determined from 4999 random permutations

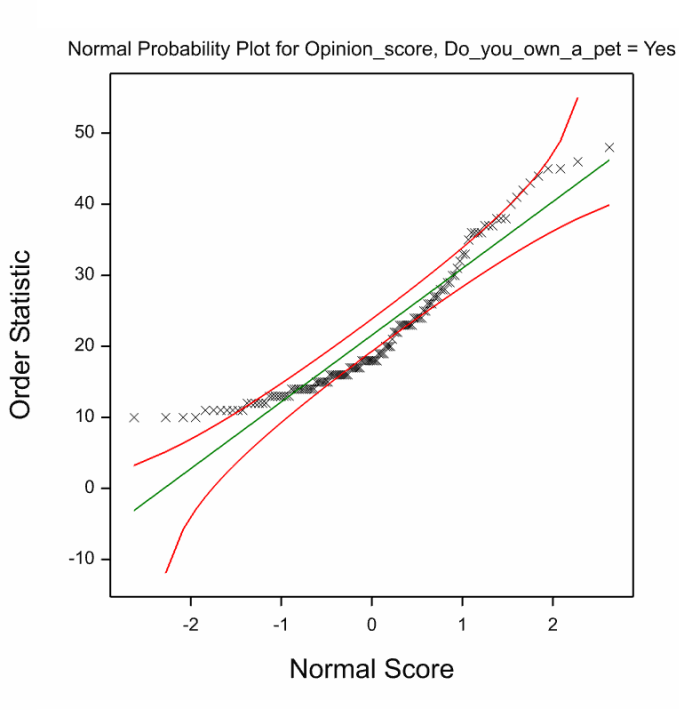
Source	d.f.	s.s.	m.s.	v.r.	prob.
Regression	1	7089.89	7089.888	183.27	<.001
Residual	152	5880.27	38.686		
Total	153	12970.16	84.772		

B3 - Mann-Whitney U test for difference in opinion in pet owners and non-pet owners









Mann-Whitney U (Wilcoxon rank-sum) test

Variate: Opinion_score
Group factor: Do_you_own_a_pet

Value of U: 1126.5 (second sample has higher rank sum).

Exact probability (adjusted for ties): 0.391
(under null hypothesis that group No is equal to group Yes).

Sample sizes: 19, 135.

Summary statistics for Opinion_score: Do_you_own_a_pet No

Number of observations =	19
Number of missing values =	0
Mean =	22
Median =	21
Minimum =	12
Maximum =	33
Lower quartile =	16.25
Upper quartile =	28.75
Standard deviation =	6.864

Summary statistics for Opinion_score: Do_you_own_a_pet Yes

Number of observations =	135
Number of missing values =	0
Mean =	21.57
Median =	18
Minimum =	10
Maximum =	48
Lower quartile =	14
Upper quartile =	26.75
Standard deviation =	9.510