

Human-directed empathy and attitudes toward animal use:

A survey of veterinary students

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Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Abstract

Veterinarian practitioners are seen by laypeople as guarantors of animal health and well-being, and traditionally are considered as a point of reference for policy development. Understanding veterinary student attitudes towards animals and animal use is key in order to assess the effectiveness of education efforts around animal welfare or ethics. The present study examined students' attitudes towards different types of animal use, human-directed empathy and the relationship between these and various personal variables. The sample comprised 200 Spanish veterinary students who participated by completing an online questionnaire. Findings showed that attitudes towards animal use varied significantly according to different ways in which animals are used, and also demonstrated a relationship between attitudes towards animal use, one component of human-directed empathy ('Empathic Concern') and a number of personal variables such as gender, career choice and contact with societies for the prevention of cruelty to animals. Our findings suggest that concern about certain types of animal use – the use of animals for research and animal management – decreased as students progress to later stages in their studies. Reasons for this and the role of veterinary education are discussed.

Key words: attitude towards animals; animal use; human directed empathy; empathic concern; questionnaire; students; veterinary

Introduction

Human perceptions of animals¹ and attitudes towards the utilisation of animals by humans (referred to here as “animal use”) are constantly evolving alongside societal changes (Driscoll, 1995; Fox, 1990; Ozen et al., 2009). Whilst many are passionate about animals, for example, in some cultures, animals kept for companionship (i.e. “pets”) are often perceived and treated as one of the family; attitudes towards animals and how we treat them are complex, and sometimes seemingly incongruent. On the one hand we love and invest in them vastly, both emotionally and financially; whilst on the other hand we use them in a multiple of ways for our own benefit. For example, animals provide us with food and clothing, we use them to test drugs, vaccines and cosmetics (Liebsch et al., 2011), we have studied their anatomy, their physiology and their behaviour in order to better understand ourselves (Schütt et al., 2016); we hunt them, but we also play with them; and we grieve for them when they die (Chur-Hansen, 2010). Moreover, attitudes towards animals and animal use can vary across societies, countries, and cultural backgrounds (Kalof, Dietz, Stern, & Guagnano, 1999; Kellert, 1980; Serpell, 2004), and can vary according to our gender (Magnani, Ferri, Dalmau & Messori, 2017; Paul & Podberscek, 2000; Taylor & Signal, 2005), age (Driscoll, 1992; Furnham & Pinder, 1990; Kellert & Berry, 1981), profession (Richards, Signal & Taylor, 2013; Signal & Taylor, 2006), religion (Phillips et al., 2012), eating habits (de Backer & Hudders, 2015), political preferences (Dhont & Hodson, 2014), education (Levine, Mills, & Houpt, 2005; Paul & Podberscek, 2000), relationships with pro-animal societies (Galvin & Herzog, 1992; Signal & Taylor, 2007) and income (Serpell, 2008).

Previous research has also suggested a relationship between empathy and attitudes towards animals (Furnham, McManus & Scott, 2003; Serpell, 1996). The term “attitude” refers to a person’s evaluation of different aspects of their lives, and as such can be positive, negative or neutral and vary in intensity and strength (e.g. see Baron, Byrne & Branscombe, 2006; Eagly & Chaiken, 1993). Empathy,

meanwhile, comprises both emotional and cognitive components, refers to the ability to recognise, understand and share the feelings of others (Davis, 1980; Preston & de Waal, 2002; de Waal, 2008), and can help to generate an appropriately caring (i.e. “empathic”) emotional response to others (Taylor & Signal, 2005). In other words, as Baron-Cohen and Wheelwright (2004) define, empathy acts like the “glue” of the social world, allowing us to understand and predict the behaviour of others, while keeping us from hurting another person’s feelings. Moreover, an intrinsic relationship has been described through human-animal bond studies which showed a generalization effect between empathy toward animals and empathy toward humans (Ascione & Weber, 1996; Sprinkle, 2008). Regarding health care professions, empathy has been reported to be a key component of the therapeutic relationship (Mercer & Reynolds, 2002), enhancing patient-physician communication and helping diagnosis (Halpern, 2003). Veterinarians, especially in companion animal practice, use this crucial skill in order to consider and assimilate both the medical needs of the pet and the emotional needs of the owner (Adams & Frankel, 2007; Mitchener & Ogilvie, 2002). However, only a few studies have examined the relationship between attitudes towards animal use and empathy in veterinary students (e.g. Calderón-Amor, Luna-Fernández & Tadich, 2017; Hazel, Signal & Taylor, 2011).

Veterinarian practitioners are seen by laypeople as guarantors and caretakers regarding animal health and well-being (Hewson et al., 2005; Ostović, Mesić, Mikuš, Matković, & Pavičić, 2016), and traditionally are considered as a point of reference for policy development (Beaver, 2005). As such, many veterinary medicine schools endeavour to include animal welfare, ethics and law in their curriculum (see Illmann et al., 2014 for a European overview). Understanding veterinarians’ attitudes towards animals and animal use is key in order to assess the effectiveness of education efforts around animal welfare, ethics and so on. Such efforts aim to ensure that our future veterinarians will advocate and promote animal health and well-being. Research examining the attitudes of veterinary students has focused mainly on the welfare of farm animals (Heleski, Mertig, & Zanella, 2005; Magnani et al.,

2017; Paul & Podberscek, 2000; Ostović et al., 2016), and the use of animals for research (Sabuncuoglu & Coban, 2008). Few studies have sought to understand veterinary students' human-directed empathy and its relationship with their attitudes towards animals and different types of animal use. However, one study indicated that, compared to their male peers, female students appeared to be more empathic (Paul & Podberscek, 2000) and express more concern for animal welfare (Hazel et al., 2011; Serpell, 2005). More recently, Colombo, Crippa, Calderari and Prato-Previde (2017) revealed a significant effect of gender on empathy toward animals in veterinarians, with females scoring higher than males. Menor-Campos et al. (In Press) found that female students from three European veterinary medicine schools showed greater concern than males regarding animal use. Other personal variables, such as living area and career choice have also been reported as related to attitudes towards animals. For example, a rural lifestyle and contact with farm animals have been associated with a lower levels of concern for animal welfare in veterinary students (Ostović, Mikuš, Pavičić, Matković, & Mesić, 2017; Serpell, 2005), whilst individuals from urban locations show greater concern for animal welfare (Kendall, Lobao & Sharp, 2006; Vanhonacker, Verbeke, van Poucke & Tuytens, 2007), despite having lower levels of knowledge regarding related issues (Miele, Veissier, Evans & Botreau, 2011).

Interestingly, several studies have warned that levels of empathy may decrease in veterinary and medical students as they progress through their studies, especially during their last years of higher education. This may have an impact on their behaviour towards and treatment of animals. For example, early year students attributed higher levels of sentience to animals than their peers in later years of study, which led the latter to be less likely to treat animals for pain (Hellyer, Frederick, Lacy, Salman, & Wagner, 1999; Paul & Podberscek, 2000). More recently, Cornish, Raubenheimer and McGreevy (2016) found that importance assigned to animal welfare also declined as students progressed through their studies. A similar loss of empathy has been observed in medical students, which is possibly related to a detached attitude towards their patients (Hojat et al., 2009; Woloschuk, Harasym, &

Temple, 2004). Reasons for a decrease in levels of empathy in veterinary students may include compassion fatigue, lack of resources and a feeling of resignation regarding some of the negative outcomes for animals they treat associated (Thomas et al., 2007).

The current study aimed to investigate attitudes towards animal use in Spanish veterinary students. A questionnaire was developed to measure attitudes and empathy, and responses were analysed to examine the relationship between these and demographic and personal variables. On the basis of previous research, it was predicted that there would be significant differences in attitudes towards different types of animal use (Hypothesis 1), that females would be more concerned about animal use compared to males (Hypothesis 2), and that females would present higher levels of empathy compared to males (Hypothesis 3). Additionally, we expected a positive correlation between higher levels of Empathic Concern and concern about animal use (Hypothesis 4). We also predicted that students who were in their early academic years would be more concerned about animal use than those in their last years of study (Hypothesis 5), as would younger students compared to older students (Hypothesis 6), and those students who had mostly lived in urban areas compared with those from more rural areas (Hypothesis 7). Finally, it was expected that students focusing on a career in small animal clinics would show more concern about animal use than students who preferred other professional options (Hypothesis 8), as would those students who had had contact with societies for the prevention of cruelty to animals (SPCA), compared to those who had not (Hypothesis 9).

Material and Methods

Participants

The sample comprised 200 students enrolled in various veterinarian years at the University of Cordoba (Spain). Table 1 presents demographic details and Table 2 shows academic year and career preferences.

– Table 1 around here –

– Table 2 around here –

The survey

A questionnaire was adapted from previously published surveys measuring attitudes toward animal use and empathy (see online supplementary file). The first section comprised six items regarding personal details – age, gender, academic year, living area, previous experience with societies for the prevention of cruelty to animals, and preferred career choice. The second section measured levels of human-directed empathy using the Spanish validated version (Pérez-Albéniz, de Paúl, Etxeberria, Montes & Torres, 2003) of the Empathic Concern subscale (comprising 8 items) of the Interpersonal Reactivity Index (IRI, Davis, 1980). The Empathic Concern subscale of the IRI has been proposed as a reliable measure of a general empathic construct (Alterman, McDermott, Cacciola & Rutherford, 2003; Cohen & Strayer, 1996) and has been used accordingly in previous research (e.g. Taylor & Signal, 2005). Statements were coded so that higher scores represented higher levels of Empathic Concern, and scores for all statements were combined so that each participant had one single score for Empathic Concern.

The third section comprised items measuring attitudes towards the use of animals (taken from Herzog, Betchart & Pittman, 1991; Knight, Vrij, Cherryman & Nunkoosing, 2004; Paul, 2000; and Serpell, 2005) and comprised eight subsections measuring attitudes towards: (i) use of animals in research; (ii) use of animals for teaching; (iii) use of animals for personal decoration – referred to as “Cosmetics”; (iv) use of animals for entertainment; (v) animal management; (vi) use of animals for financial gain – referred to as “Business”; (vii) use of animals for companionship; and (viii) veterinary issues regarding the use of animals. All items were followed by a five point Likert-like scale (from “fully disagree” to “fully agree”). Statements were coded so that higher scores represented more concern for animals (i.e. less support for animal use), except for category “use of animal for companionship”. This category is

different to other types of animal use in that in general the animal benefits from being kept as a companion. High scores represent a positive attitude towards keeping animals for companionship. For example, a positive attitude would be one where the participant 'agreed' or 'strongly agreed' with statements such as 'Pets have a great influence on my moods' , and where the participant 'disagreed' or 'strongly disagreed' with statements such as 'Sometimes I am amazed how upset people get when an old pet dies'.

Procedure

Questions were translated into Spanish when necessary using the back-translation procedure (Brislin, 1970), and Google Forms® technology (www.google.com/forms), a tool to design online surveys, was used to collect data. Potential participants were informed of the study during class time, and via advertisements on a bulletin board at the veterinary school. They were informed that the purpose of the survey was to gain understanding of the human-animal relationship, and that their responses would remain anonymous and be used for scientific research only. They were not informed explicitly that the questionnaire was aimed at assessing empathy and attitudes towards animal use, in order to avoid any potential response bias.

Ethical code

This work was carried out in accordance with the Code of Ethics of the University of Cordoba, Spain (Universidad de Córdoba, 2015).

Statistical Analyses

All statistical analyses were performed with the software SPSS v.22, and non-parametric analyses were conducted when appropriate. The values obtained were analysed with Kruskal-Wallis, Mann-Whitney or Spearman's Rho tests ($p < 0.05$). When the Kruskal-Wallis test showed significant differences, the Dunn test with Bonferroni correction was used to perform pairwise comparisons.

Examining the reliability of the questionnaire

In order to test the reliability of the questionnaire, several consistency analyses were performed as recommended by Peters (2014): Cronbach's alpha (Cronbach, 1951), omega (Revelle & Zinbarg, 2009), and the greatest lower bound to reliability index (Sijtsma, 2009). Both the greatest lower bound (glb) and omega are available in the free and open source package R (R Development Core Team, 2014). The overall scale was found to be highly reliable, but did vary between sub-sections measuring attitudes towards different types of animal use (see Table 3).

– Table 3 around here –

Results

Attitudes towards animal use and Empathic Concern

Median scores representing levels of concern for different types of animal use and Empathic Concern are presented in Table 1. Higher values indicate more concern for animals and less support for that type of animal use, except for 'companionship', where higher values indicate more support for companion animals. Students were most concerned about veterinary issues and using animals for cosmetics, they supported using animals for companionship, and were least concerned about using animals for research and teaching purposes. Scores for Empathic Concern were above the mid-point.

Correlations between animal use categories

Spearman's rank correlations showed strong relationships between attitudes towards different ways in which animals are used (see Table 4).

– Table 4 around here –

Attitudes towards animal use

Hypothesis 1 predicted that attitudes would vary towards different types of animal use. Related-samples Friedman's Two-Way ANOVA by Ranks revealed significant differences between attitudes towards some types of animal use (see Table 1; Adj. Sig $p < 0.001$), and thus Hypothesis 1 was supported.

There were three levels of concern regarding types of animal use. Participants showed most concern for veterinary issues and for cosmetics, and support for using animals for companionship. They were less concerned about animal management, and using animals for entertainment and for financial gain, and least concerned about the use of animals for medical research and for teaching.

Participant variables, attitudes towards animal use and empathy

To examine the relationship between personal variables, attitudes towards animal use and empathic concern, Pearson's correlation (on age, academic year and empathy), and Spearman's rank correlation coefficient were performed. Also, as recommended by Starkweather (2017), in order to examine the predictive value of participant variables on attitudes towards different types of animal use, Categorical Regression analyses were conducted. Successive regression analyses were carried out after excluding those predictors that were revealed as unimportant in previous analyses.

It was predicted that gender would be related to concern for animal use and Empathic Concern (Hypotheses 2 & 3), and that Empathic Concern would correlate with concern about animal use (Hypothesis 4). It was also expected that years of study, age, living area, career choice and contact with SPCA would be related to attitudes towards animal use (Hypotheses 5-9). Correlations and Categorical Regression Analyses examined the predictive value of participant variables and empathy on scores for attitudes toward different types of animal use (see Table 5).

– Table 5 around here –

Correlations between participant variables, attitudes towards animal use and empathy

First, being female, having contact with SPCA, and scoring higher on measures of human-directed empathy were related to more concern about all types of animal use (providing support for Hypothesis 2, 4, and 9). Similarly, being female and having contact with SPCA were related to higher levels of empathy (providing support for Hypothesis 3).

As students progressed through their studies, concern regarding the use of animals for research and animal management decreased (providing partial support for Hypothesis 5). However, higher levels of concern for animals for entertainment and regarding veterinary issues categories increased with age (partially contradicting Hypothesis 6).

Living in urban areas was related to higher levels of concern for animal use for business, and higher support for the use of animals for companionship (i.e. a positive attitude towards pets) (providing partial support for Hypothesis 7). Finally, higher levels of Empathic Concern were related to higher levels of concern for all types of animal use, and less concern about the use of animals for companionship (providing support for Hypothesis 4).

Overall attitudes towards animal use

Age, gender, academic year, career choice and contact with SPCA accounted for 39.8% of the variance in the overall score for attitudes towards animal use. Females were less supportive of animal use (Table 1; Mann-Whitney $U = 5720$; $p < 0.001$), as were those who had had contact with SPCA (Table 1; Mann-Whitney $U = 2361$; $p < 0.001$). Compared to those who chose animal management or public health as a career choice, those wishing to work with wild animals were more concerned about animals and

animal use, as were those students who aim to work in small animals clinics compared to those who chose animal management (see Table 6; Kruskal-Wallis test $H = 34.302$; $p < 0.001$; Adj. Sig. $p < 0.05$).

– Table 6 around here –

Attitudes towards using animals for research

Age, gender, academic year, career choice, and having had contact with SPCA accounted for 21.1% of the variance in attitudes towards using animals for research. Females were more concerned about using animals for research (Table 1; Mann-Whitney $U = 5435.5$; $p < 0.001$), as were those who had had contact with SPCA (Table 1; Mann-Whitney $U = 2845$; $p < 0.001$). Independent-samples Kruskal-Wallis test found significant differences in terms of academic year of study (Table 1; Kruskal-Wallis $H = 10.143$; $p = 0.038$), but post-hoc pairwise comparisons did not. Regarding career choice, Independent-samples Kruskal-Wallis test found significant differences as well (Table 6; Kruskal-Wallis $H = 17.767$; $p = 0.007$), but again post-hoc pairwise comparisons did not (possibly due to sample size effects).

Attitudes towards using animals for teaching

Age, gender, living area, career choice and contact with SPCA accounted for 16% of the variance in attitudes towards using animals for teaching purposes. Females were more concerned about using animals for teaching (Table 1; Mann-Whitney $U = 5322.5$; $p < 0.001$), as were those who had had contact with SPCA (Table 1; Mann-Whitney $U = 5322.5$; $p < 0.001$), and those who wished to work in animal management compared to those who preferred to work in small animals clinics or with wild animals (see Table 6; Kruskal-Wallis test $H = 21.925$; $p = 0.001$; Adj. Sig. $p < 0.05$).

Attitudes towards using animals for cosmetics

Age, living area, career choice and contact with SPCA accounted for 19.8% of the variance in attitudes

towards the use of animals for personal decoration (“Cosmetics”). Those students who had had contact with SPCA were more concerned (Table 1; Mann-Whitney $U = 4954.5$; $p = 0.001$), and those who wished to work in small animals clinics were more concerned about using animals for personal decoration compared to those who wished to work in animal management (see Table 6; Kruskal-Wallis test $H = 25.104$; $p < 0.001$; Adj. Sig. $p < 0.05$).

Attitudes towards using animals for entertainment

Age, gender, career choice and contact with SPCA accounted for 21.8% of the variance in attitudes towards using animals for entertainment. Females were more concerned about this type of use (Table 1; Mann-Whitney $U = 5012.5$; $p = 0.001$), as were those students who had had contact with SPCA (Table 1; Mann-Whitney $U = 3359$; $p < 0.001$). Those who wished to work with wild animals were more concerned than those who chose to work in animal management or public health, as were those students who wished to work in small animals clinics compared to those who chose animal management (see Table 6; Kruskal-Wallis test $H = 28.337$; $p < 0.001$; Adj. Sig. $p < 0.05$).

Attitudes towards animal management

Age, gender, academic year, career choice and contact with SPCA accounted for 26.2% of the variance in attitudes towards animal management. Females were more concerned about animal management (Table 1; Mann-Whitney $U = 5535.5$; $p < 0.001$), as did those who had had contact with SPCA (Table 1; Mann-Whitney $U = 2848.5$; $p < 0.001$). Students who wished to work in the wild animals sector were more concerned than those who chose animal management or public health, as were those students who wished to work in small animals clinics compared to those who chose animal management (see Table 6; Kruskal-Wallis test $H = 27.420$; $p < 0.001$; Adj. Sig. $p < 0.05$).

Attitudes towards using animals for financial gain

For attitudes towards using animals for financial gain (“Business”), age, gender, academic year, career choice and contact with SPCA accounted for 29.3% of the variance. Females were more concerned about using animals for financial gain (Table 1; Mann-Whitney $U = 5371$; $p < 0.001$), as were those who had had contact with SPCA (Table 1; Mann-Whitney $U = 2765.5$; $p < 0.001$). Again, those students who wished to work in the wild animals sector were more concerned than those who chose animal management or public health, as were those students who desired to work in small animals clinics compared to those who chose animal management (see Table 6; Kruskal-Wallis test $H = 32.401$; $p < 0.001$; Adj. Sig. $p < 0.05$).

Attitudes towards using animals for companionship

Note that a high score represented using animals for companionship and positive attitudes towards pets. Gender, career choice and contact with SPCA accounted for 29.3% of the variance in attitudes towards using animals for companionship. Females showed stronger support regarding the use of animals for companionship (Table 1; Mann-Whitney $U = 5615$; $p < 0.001$), as were those who had contact with SPCA (Table 1; Mann-Whitney $U = 2698.5$ $p < 0.001$), and those students who wished to work in small animals clinics compared to those who chose animal management (see Table 6; Kruskal-Wallis test $H = 19.658$; $p = 0.003$; Adj. Sig. $p < 0.05$).

Attitudes towards veterinary issues

Regarding veterinary issues, age, gender, career choice and contact with SPCA accounted for 31.6% of the variance in attitudes. Females were more concerned than males (Table 1; Mann-Whitney $U = 5301.5$; $p < 0.001$), as were students who had contact with SPCA (Table 1; Mann-Whitney $U = 2655$; $p < 0.001$).

Discussion

The aim of the current study was to better understand veterinary students' attitudes towards animal use, and how these views are related to human-directed empathy and personal variables. Our findings show that attitudes towards animal use varied for different ways in which animals are used, and Empathic Concern was positively correlated with concern about animal use. Personal variables that accounted for variance in attitudes include gender, age, living area, year of study, career choice, and contact with SPCA.

Attitudes towards animal use

As expected, attitudes towards animal use varied for different types of animal use, in keeping with previous research (Byrd, Widmar & Fulton, 2017; Knight et al., 2004; Knight & Barnett, 2008; Knight, Bard, Vrij, & Brandon, 2010; Hazel, Taylor & Signal, 2011). Previous research has argued that such differences might be due to whether perceived costs (to animals) outweigh perceived benefits (to humans) regarding each type of animal use (Knight et al., 2004), whether animal use is perceived as necessary and beneficial to humans (Knight & Barnett, 2008), and whether alternatives to using animals are known about or perceived as available and/ or appropriate (referred to as 'perceptions of choice') (Knight et al., 2010). In fact, Knight et al. (2010) found that perceptions of choice alone accounted for around 40% of the variance in attitudes. The same study also found evidence for a causal relationship between perceptions of choice and attitudes towards animal use: When perceptions of choice were manipulated, attitudes changed. Veterinary students in the current study may perceive the benefits of using animals for research and teaching as outweighing the costs, and/or believe that credible alternatives to using animals do not exist. Conversely, it is now widely known and accepted that there are alternatives to using animals for cosmetic testing, and the costs are unlikely to be perceived as outweighing the benefits. Indeed, Knight et al. (2010) found that laypersons were more

supportive of animal use for medical research than for personal decoration and entertainment, and, more recently, Byrd et al. (2017) found that people were less supportive of use of animals for entertainment, namely greyhound racing or circuses compared to animal use for food.

Perceptions of choice and cost-benefit analysis may, at least partially, explain these findings and would fit with Social Science theories and models that assume that human decision making is based on consideration of information available that leads to rational choices being made. Moreover, for those particularly involved in using animals for specific purposes (in this case, veterinary students who rely on this use for research and teaching to further their education and training), cognitive dissonance may motivate individuals to justify their participation in the activities by adjusting beliefs so that they are congruent with their attitudes and behaviours. Lower levels of perceptions of choice (in this case, believing that there are no alternatives) and/ or belief in animal mind (e.g. believing in animal cognition and sentience) may allow them support animal use. That belief in animal sentience in veterinary students declines over time supports this explanation (Hellyer et al., 1999; Paul & Podberscek, 2000).

The present study found that concern regarding the use of animals was highest for veterinary issues. Here, veterinary students were presented with various statements that included a moral dimension and related to practices that veterinarians may be faced with in their work. Most students may reject these controversial issues because the benefits of such activities are difficult to justify against the costs, and it is likely that alternatives (e.g. rehoming) are perceived as available (i.e. perceptions of choice plays a role).

Personal variables, attitudes towards animal use and empathy

Empathy is desirable among health related workers (Halpern, 2003; Mercer & Reynolds, 2002), as empathic physicians may more properly alleviate patients' pain and/or suffering (Norrington, Wikman,

Hokkanen, Kujala, & Hänninen, 2014). Levels of empathy among respondents were similar to those previously reported for veterinary students (Calderón-Amor et al., 2017; Hazel, Taylor & Signal, 2011; Taylor & Signal, 2005).

The relationship between empathy and attitudes towards animals has been previously studied in female undergraduate Sociology and Psychology students (Taylor & Signal, 2005) and among veterinary students (Calderón-Amor et al., 2017; Hazel, Signal & Taylor, 2011) showing that the greater the human-directed empathy, the more positive peoples' attitudes toward animals are likely to be (whereas a lack of empathy has been identified to be crucial in those responsible for animal abuse) (McPhedran, 2009). Among our students, significant positive correlations were found between human-directed empathy and attitudes towards animal use.

Compared to males, females have consistently been found to be more concerned about animals and animal use (Apostol, Rebege & Miclea, 2013; Menor-Campos et al., In Press; Colombo et al., 2017; Knight et al., 2004; Ozen et al., 2009; Paul & Podberscek, 2000; Sánchez-Muñoz, 2017; Serpell, 2005; Taylor & Signal, 2005), and show more concern regarding other human beings' problems (Hojat et al., 2009; Rueckert, Branch, & Doan, 2011; Santos, Grosseman, Morelli, Giuliano, & Erdmann, 2016). Considering that the large majority of those in the veterinary profession are female (Irvine & Vermilya, 2010; Ostović et al., 2016), this is important, and may infer that male veterinary students in particular may benefit from education regarding animal welfare in order to increase their concern about animal use where appropriate (Hazel, Signal & Taylor, 2011; Pollard-Williams, Doyle & Freire, 2014).

The finding that students who had had a relationship with SPCA showed greater concern about animal

use is not surprising. Previously it was found that ‘animal welfarists’ (active members of animal welfare organisations) were more empathetic toward animals, show more concern regarding the use of animals for medical research, entertainment and animal management practices (Knight et al., 2010), supported animal rights over the human benefit of their use (Baldwin, 1993; Herzog, 1990; Knight et al., 2010), and had greater levels of belief in animal cognition and animal sentience (Knight, Vrij, Bard & Brandon, 2009). All these factors have been identified as crucial for concern about animals (Knight et al., 2010), therefore, beliefs about animals and concern about animal use is likely to lead to contact with SPCA, or vice versa.

Career choice was consistently found to be a predictor of attitudes towards all types of animal use, but there were several significant differences regarding students' future career aspirations and their attitudes towards animal use. For example, those intending to work in small animal clinic or wild animals sector were more concerned about animal use than those wishing to work in animal management or the public health sector. This reflects previous research findings whereby those students intending to work with companion animals (Levine et al., 2005; Ostović et al., 2017) or with wild animals (Hazel et al., 2011) expressed more concern for farm animal welfare. Serpell (2005) found that veterinary students who had lived or worked on a farm were more supportive of hunting, the use of live animals to teach surgery, and toward the performance of euthanasia on a healthy animal at a client's request. Interestingly, Serpell also found that these students chose food-animal practice as their career choice. We agree with Ostović et al. (2017) and Serpell (2005), in that a decrease in concern in students eager to work with farm animals might reflect a more utilitarian point of view, which is common in those working in food animal production.

Other personal variables, namely age, academic year and urban background were related to higher levels of support for some types of animal use. Previous research examining such variables has led to

mixed findings. For example, whilst some research suggested that age is not related to concern for animals (Kılıç & Bozkurt, 2013; Köhler, 2001), others found a negative relationship between these factors. Maria (2006) reported that interest in animal welfare is expressed more often by young and middle-aged people and less often by older people. Clark et al. (2016) identified similar effects in a general population, and later Ostović et al. (2017) found that younger veterinary students showed greater concern regarding farm animal welfare (see also Byrd et al., 2017; Driscoll, 1992; Kellert & Berry, 1981). It may be that concern for animal use decreases as a result of education and/or the culture of the academic institution where people study. For example, the culture may promote the benefits of animal use for humans and play down any associated costs to the animals involved. Alternatively, more concern in younger people may reflect a change in trends whereby these may be more aware of and concerned about farming and food issues. For example, a desire to know where food comes from and how it is produced.

There were also changes in attitudes towards animal use as students progressed through their studies, similar to those in other caring professions such as nursing and medicine (Hojat et al., 2009; Woloschuk et al., 2004). Early-years students are more likely to assign higher levels of sentience to animals (Paul & Podberscek, 2000), express greater concern about animal pain (Hellyer et al., 1999) and concern about animal welfare (Hazel et al., 2011; Pollard-Williams et al., 2014; Ostović et al., 2017). In keeping with these findings, our results suggested that early-years students were more concerned about the use of animals for research and animal management. Pollard-Williams et al. (2014) suggested that student concern for animals may change over time when they are exposed to practice. Similar to human medicine students, veterinary students may experience compassion fatigue and burn out (Thomas et al., 2007) and use detachment strategies to reduce distress experienced as a consequence of their work (Woloschuk et al., 2004). Moreover, negative experiences such as unpleasant surgeries or the sense of guilt for not being able to save an animal's life (Herzog, Vore &

New, 1989) might push them to perceive animals “simply as 'instruments’” (as suggested by Ostović et al., 2017, p. 424).

Recommendations for future research

As a large proportion of the variance in attitudes was unaccounted for, other variables need to be investigated in future research - e.g. belief in animal mind, cost-benefit analysis and perceptions of choice, compassion fatigue, burn out and the use of detachment strategy to reduce unpleasant emotions experienced as a result of veterinary practice. Further research is also needed to better understand how education and other interventions might increase empathy and counter the reduction of empathy in veterinary students as they progress through their studies.

Limitations

Finally, we acknowledge that the current study collected data only from students who volunteered to participate – which may have biased results. Also, all were studying at one specific veterinary school, which may reduce the generalisability of findings.

Conclusions

Veterinarian students studied here showed varying levels of concern regarding different types of animal use, and factors such as empathy, gender, career choice, year of study and previous relationships with SPCA were related to their attitudes. Future research needs to examine this relationship further, in particular the role of empathy, and also include measures of other factors that might account for more of the variance in attitudes towards animal use. Others who play a role in safeguarding animal welfare should also be investigated.

Notes

1. We use the term 'animal' throughout this article to mean all non-human animals.
2. 'Utilitarianism' is the view that the morally right action is the action that produces the most good
(Driver, 2014)

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Tables

Table 1. Demographic and median values of veterinary students.

	N	RS	TE	CO	ENT	MNG	BS	CA	VI	TS	E
Gender											
<i>Male</i>	51	2.60*	2.75*	4.00	3.40*	3.17*	3.45*	3.58*	4*	26.62*	30
<i>Female</i>	149	3.33*	3.00*	4.50	3.80*	3.83*	3.91*	4.31*	4.5*	31.50*	33
Living area											
<i>Urban</i>	144	3.18	3.00	4.40	3.80	3.83	3.91	4.23	4.5	31.08	33
<i>Rural</i>	56	3.00	3.00	4.40	3.40	3.67	3.64	4.00	4.25	29.17	32
SPCA											
<i>Yes</i>	106	3.50*	3.25*	4.60*	3.90*	4.00*	4.05*	4.32*	4.5*	32.11*	34
<i>No</i>	94	3.00*	2.75*	4.10*	3.40*	3.50*	3.64*	3.75*	4*	28.31*	31
Academic year											
<i>1</i>	20	3.50	3.00	4.30	3.70	4.17	3.91	4.35	4.12	32.06	32
<i>2</i>	40	3.27	3.00	4.20	3.60	4.00	3.86	4.35	4.50	30.92	32
<i>3</i>	35	3.17	2.75	4.40	3.60	3.83	3.64	4.00	4.25	29.75	33
<i>4</i>	29	3.33	3.25	4.40	3.80	3.83	3.91	4.31	4.50	31.64	33
<i>5</i>	76	3.00	3.00	4.40	3.90	3.55	3.73	4.15	4.50	30.46	32
Overall	200	3.17 _d	3.00 _d	4.40 _{a,b}	3.80 _c	3.78 _c	3.82 _c	4.16 _b	4.50 _a	30.68	32

In columns, the different subcategories of the attitude scale: RS (research); TE (teaching); CO (Cosmetics); ENT (Entertainment); MNG (Management); BS (Business); CA (Companion animals); VI (Veterinary Issues); TS (Total score); E (Empathy). * indicates significant differences found (identified via Categorical regression analysis and subsequent Mann-Whitney test). In the ‘Overall’ row, Medians that were similar but differed significantly from others (identified via Kruskal-Wallis and post-hoc pairwise comparisons tests), are grouped together and share the same subscript.

Table 2. Veterinary students career choice according to year of study

<i>Career choice</i>	<i>Academic Year</i>					<i>Total by career choice (%)</i>
	<i>First</i>	<i>Second</i>	<i>Third</i>	<i>Fourth</i>	<i>Fifth</i>	
<i>Horses clinic</i>	1	2	2	4	3	12 (6.25%)
<i>Small animals clinic</i>	15	20	14	13	45	107 (55.73%)
<i>Wild animals</i>	2	7	4	1	4	18 (9.38%)
<i>Research</i>	0	0	0	1	1	2 (1.04%)
<i>Others</i>	0	3	2	1	1	7 (3.65%)
<i>Animal farm management</i>	1	5	10	5	16	37 (19.27%)
<i>Public health</i>	1	2	0	3	3	9 (4.69%)
<i>Total by years (%)</i>	20 (10.42%)	39 (20.31%)	32 (16.67%)	28 (14.58%)	73 (30.02%)	192

Table 3. Consistency analyses (Cronbach's alpha, McDonald's omega and Greatest Lower Bound (GLB) for different categories (types of animal use) and the overall scale measuring attitudes towards animal use.

Category name	Cronbach's α	McDonald's omega	GLB
Research	0.86	0.86	0.87
Teaching	0.42	0.58	0.63
Personal decoration (cosmetics)	0.81	0.81	0.8
Entertainment	0.77	0.77	0.77
Animal management (management)	0.77	0.77	0.8
Financial gain (business)	0.85	0.83	0.89
Companionship	0.81	0.86	0.85
Veterinary issues	0.69	0.71	0.67
Overall scale	0.95	0.95	0.94

Table 4. Spearman's rank correlation coefficient between different types of animals use.

	Research	Teaching	Cosmetic Use	Entertainment	Management	Business	Companionship
Research							
Teaching	0.516**						
Cosmetics	0.565**	0.378**					
Entertainment	0.446**	0.358**	0.436**				
Management	0.665**	0.456**	0.571**	0.369**			
Business	0.730**	0.535**	0.665**	0.518**	0.691**		
Companionship	0.635**	0.467**	0.572**	0.409**	0.688**	0.694**	
Veterinary Issues	0.520**	0.443**	0.476**	0.434**	0.436**	0.604**	0.470**

** . Correlation is significant at the 0.01 level (2-tailed). High correlations indicated strong relationships between pro-animal attitudes towards different ways in which animals are used.

Table 5. Correlations and Categorical Regression outcomes.

		RS	TE	CU	ENT	MNG	BS	CA	VI	TS
Age _a	r	0.02	0.132	0.133	0.192**	0.021	0.099	0.054	0.180*	0.130
Gender _b	r	0.326**	0.304**	0.231**	0.243**	0.346**	0.313**	0.361**	0.31**	0.382**
Living Area _b	r	-0.088	-0.015	-0.042	-0.124	-0.124	-0.183**	-0.178*	-0.136	-0.158*
Academic Year _a	r	-0.195**	-0.013	0.018	0.137	-0.202**	-0.055	-0.096	0.069	-0.063
SPCA _b	r	0.371**	0.286**	0.326**	0.284**	0.371**	0.385**	0.397**	0.405**	0.455**
Empathy _a	r	0.265**	0.160*	0.268**	0.239**	0.255**	0.350**	0.314**	0.257**	0.339**
Age	B	0.253	0.16	0.21	0.254	0.166	0.335		0.268	0.241
Gender	B	0.199	0.212		0.143	0.189	0.187	0.236	0.190	
Living Area	B		0.157	0.174						
Academic Year	B	-0.398				-0.313	-0.281			
Career choice	B	0.204	0.308	0.328	0.35	0.277	0.301	0.236	0.203	0.332
SPCA	B	0.253	0.18	0.31	0.156	0.279	0.062	0.321	0.305	0.318
Adj. r ²		0.211	0.175	0.198	0.218	0.262	0.293	0.293	0.251	0.375
F		4.002	3.904	4.616	4.547	4.569	6.277	10.918	5.242	13.743
p		***	***	***	***	***	***	***	***	***
df		17;192	14;192	13;192	15;192	19;192	15;192	8;192	15;191	8;192

a. Pearson correlation b. Spearman's rank correlation coefficient. *. Correlation significant at the 0.05 level (2-tailed); **. Correlation significant at the 0.01 level (2-tailed); ***. Correlation significant at the 0.001 level (2-tailed).

In columns, the different subcategories of the attitude scale: RS (research); TE (teaching); CU (Cosmetic use); ENT (Entertainment); MNG (Management); BS (Business); CA (Companion animals); VI (Veterinary Issues); TS (Total score); E (Empathy).

Table 6. Medians by career choice. Subscript letters indicate pairwise comparisons with significant differences (Adj. P<0.05) between career choices among each type of animal use.

Career choice	Research	Teaching	Cosmetic Use	Entertainment	Management	Business	Companion Animals	Veterinary Issues	Total Score
Horses	3.000	3.125	4.000	3.500	3.733	3.682	3.839	4.183	3.622
Small animals	3.333	3.000 _a	4.600 _c	3.800 _d	4.000 _f	4.000 _h	4.308 _j	4.600	3.955 _i
Wild animals	3.667	3.333 _b	4.500	4.000 _e	4.183 _g	4.273 _i	4.269	4.667 _k	4.125 _m
Research	3.167	3.875	4.700	3.700	3.917	4.091	4.038	4.417	3.988
Others	3.667	2.750	4.400	3.500	4.000	3.636	4.231	4.167	3.855
Animal management	2.833	2.750 _{ab}	4.000 _c	3.200 _{db}	3.333 _{fg}	3.400 _{hi}	3.667 _j	4.167	3.348 _{lm}
Public health	2.400	2.500	4.000	3.200 _e	3.333 _g	3.182 _i	3.385	4.042 _k	3.053 _m

cohort study. *Medical Educacion*, 38, 522–34.