Perceptions of animal welfare and exotic pet ownership in China

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Abstract

China plays a critical role in global biodiversity conservation, as both a biodiversity hotspot and for its role in international and domestic animal trade. Efforts to promote wildlife conservation have sparked interest in the attitudes held by Chinese citizens towards animals. Using a questionnaire, we sought to investigate the attitudes of 317 Chinese nationals across 22 provincial-level administrative units regarding their uses of animals, their perceived emotional capacities and views on exotic pets. We reduced the variables related to perceived uses of

animals via Principal Component Analysis and ran Generalised Linear Models and Structural Equation Modelling to test relationships between questionnaire-derived variables. Perceptions of animals were divided into two Kellert categories — Utilitarian and Humanistic uses — and 97% of participants believed in animals' capacities to have and express emotions. We found few interactions, with exotic pets, ie playing with or taking photographs, but the acceptability of owning an exotic pet influenced the likelihood of purchasing one. A belief that animals express emotions encouraged people to look for them as pets but thinking that pets make people happy made exotic pet ownership less acceptable. The shift in attitudes to include humanistic perceptions of animals, a belief in animals as emotive beings and understanding of terminology changed from the previous utilitarian views of pre-reform China, suggesting a readiness to embrace further conservation efforts in China. This deeper understanding of Chinese attitudes towards animals and drivers of the exotic pet trade within China may enable conservation efforts to better target future campaigns.

Keywords: animal welfare, China, conservation, exotic pets, perceptions, public attitudes

Introduction

Human perceptions of wild animals can aid in the preservation as well as in the decline of species (Alexander *et al* 2015). Understanding what influences these attitudes is key to improving the lives of animals and facilitating conservation approaches that attract stakeholders and the public (Davey 2006; Jenks *et al* 2010; Ebua *et al* 2011; van der Ploeg *et al* 2011). Where attitudes towards wildlife are unfavourable due to misconceptions, lack of information, or perceived human dominance over animals, public support for species conservation can be considerably limited (Wilson & Tisdell 2007). Conversely, where residents hold positive

perceptions towards particular species and appreciate their presence as part of the environment, there can be support and acceptance for the conservation and restoration of species' populations (Clergeau *et al* 2001; Jenks *et al* 2010).

China plays a critical role in global biodiversity conservation, including management of threatened wildlife, protection of large wilderness areas, maintaining some of the world's largest river systems, and regulating the international trade in wildlife. China has been named one of the eight richest biodiverse countries in the world (Myers *et al* 2000). Despite China's global biodiversity importance, no general animal welfare laws protecting wildlife exist in the country. Instead, regulations regarding animal protection are strewn throughout various laws and policies Li & Davey 2013), containing ambiguous phrasing such as 'rational use' or 'sustainable exploitation' (Carpenter & Song 2016). Strides have been made towards demonstrating willingness to work with international trade regulations to protect China's and global wildlife, such as the signing of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES; Li & Wang 1999), along with efforts to enact a near complete ban on ivory import and export (Yu *et al* 2017). China has also seen a growth in the presence of local and national animal protection and welfare groups (Lu *et al* 2013), as well as international non-government organisations (NGOs; Li 2006). Acceptance of the presence of NGOs and activists does not necessarily translate to a change in attitudes towards animals; it may only reflect a changing attitude to human societal behaviours.

China is a major player in the international trade of animals and animal products (Nijman 2010; Smith *et al* 2017), including Traditional Chinese Medicine (TCM), ornaments or clothing (Zhang & Yin 2014), and exotic pet trade and ownership (Zhang *et al* 2008; Zhang & Yin 2014; Nguyen & Ziegler 2015). Previous investigations into Chinese people's perceptions surveyed discrete populations such as zoo visitors (Zhao & Wu 2011) or rural villagers and farmers (Wang *et al*

2006; Liu *et al* 2011; Xu *et al* 2015), and focused on ethical ideologies and awareness (Su & Martens 2017) or the impact of NGO campaigns (Carpenter & Song 2016). Due to China's ecological diversity and prominence in the global and domestic live wildlife and wildlife product trade, it is vital to understand more general views towards non-human animals and how these may affect conservation efforts.

Following Kellert's (1984, 1985) classifications, attitudes towards animals in China have been described as becoming more humane, naturalistic and ecologically focused; in general, people reported being both loving and feeling positive towards animals (Carpenter & Song 2016; Su & Martens 2017). Compared to their Western counterparts, Chinese citizens were less likely to hold moral and aesthetic attitudes, express concern for treatment of animals, or want to see animals in the wild (Su & Martens 2017). They were also more likely to dislike or fear animals and believed that nature exists to benefit people, but also believed animals to be capable of emotions (Packer *et al* 2014). Younger people, aged 19–44, in China held more positive attitudes towards animals than middle-aged, aged 45–59, or older people, aged 60+ years (Su & Martens 2017). Older people were more aware of and care more about animal welfare than the younger and middle-aged respondents (Zhao & Wu 2011). The discrepancy in attitude across age ranges suggests a significant conflict in the global understanding of Chinese attitudes towards animals and wildlife, which may impact conservation efforts. Here, we investigate the general views of Chinese citizens on animal uses and animals' emotional capacity. Additionally, as wild animal trade is increasingly prevalent within and around China's borders, we surveyed awareness of owning exotic pets, interactions with exotic pets, and acceptability of exotic pet ownership. We investigated the following questions:

• What are the general perceived uses of animals and do they reflect the humane, moralistic attitudes previously reported by Kellert (1984, 1985)?

94 • What are the emotional capacities of animals perceived to be?

95 • What are the most common thoughts and behaviours with regards to exotic pet interactions?

96 • What is driving exotic pet purchases in China?

97 • How do Chinese people define the term exotic pet?

98 We hypothesised that public perceptions regarding the use of animals would be humane, as
99 suggested by Carpenter and Song (2016), and show a belief in the emotional capacity of animals,
100 as observed by Packer *et al* (2014). We also hypothesise attitudes will be somewhat utilitarian
101 due to the presence of animal and animal-derived products in China (Smith *et al* 2017).
102 Additionally, due to this presence of animal and animal-derived products, we expected the public
103 in China to interact with 'exotic' wildlife and/or pets and these interactions to influence their
104 perception regarding the acceptability of exotic pet ownership.

105 **Materials and methods**

106 We collected data via an online survey from September 2017–August 2018 using a Chinese web-
107 survey site (https://www.wjx.cn/m/16573892.aspx). The survey was accessed and shared through
108 WeChat, China's most popular messaging and social media app. As WeChat is a closed, social
109 media platform, meaning users may interact only with those they have accepted a request from or
110 accepted an invitation to a group chat and a general profile is not public, the authors shared the
111 survey on non-animal related public free-topic chats, on their own posts (known as 'moments'),
112 in private chats and requested friends and families to share with others (snowball sampling).
113 Using snowball sampling enabled us to gain access to a higher diversity of respondents than
114 would otherwise have been possible due to the sensitive nature of the topic (Dusek *et al* 2015).
115 The research was conducted from Oxford, UK.

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Questionnaire

In order to investigate the general attitudes, perceptions and interactions with animals and exotic pets, we asked participants 20 questions (see supplementary material to papers published in *Animal Welfare*: https://www.ufaw.org.uk/the-ufaw-journal/supplementary-material). These included six closed-answer items with a forced Yes/No or a third None/Unsure choice, three multi-answer questions, six open-answer questions, one Likert scale question regarding the acceptability of exotic pet ownership and four demographic items. Use of closed-answer items allowed for inclusion of those who may not be able to respond sufficiently to open-answer questions, reducing the likelihood of an overrepresented age or education level (Berinsky *et al* 2014). We included open-answer questions to allow participant responses which would be both spontaneous and unbiased (Reja *et al* 2003). These questions were not mandatory to progress through the questionnaire.

Yes/No items included: (1) animals can express emotions; (2) domestic animals can make people happy; (3) exotic pets can make people happy; (4) are you aware of exotic pet keeping practices? (5) pet ownership status, ie have or do not have a pet; and (6) is your pet classified as domestic or exotic? Multi-answer items related to: (1) perceived uses of animals such as food, status, and companionship typologies; (2) emotions they felt animals could express; and (3) previous interactions with exotic pets, such as playing with, taking photographs or purchasing one. Of the six open-answer questions, two were 'Other: please explain' following the question of perceived uses and the demographic question related to upbringing location. With the remaining four questions we asked participants how long they had owned a pet, motivations for pet ownership, current residence at a city/province level and what they perceived to be an 'exotic pet.' This particular open-answer question was included as the term exotic pet often incorporates animals that are classed as non-native, non-traditional, or both, pets (Marano *et al* 2007). Thus, we wanted to determine if participants separated illegal or unsuitable exotic pets such as primates or

142 wild carnivores from 'acceptable' semi-domesticated exotic pets for which commercial care-
143 taking products are readily available, such as guinea pigs or ferrets, and if their examples of
144 'exotic pets' suggested the issue of ownership was not simply due to misunderstanding of
145 terminology.

146 The questionnaire (supplementary material; https://www.ufaw.org.uk/the-ufaw-
147 journal/supplementary-material) was designed in English and translated into Mandarin Chinese
148 by X Zhang, who holds an Institute of Linguists (IoL) Educational Trust Mandarin to English
149 translation qualification. The term 'exotic pet' was translated as 'wild animal pet' or 'wildlife
150 pet' ('野生⊠物⊠物'), as this term was considered to be more commonly used and better
151 understood in China. For this report, hereafter, we use the term 'exotic pet.' The Oxford Brookes
152 University Research Ethics Committee approved this study and authors have no conflict of
153 interest to declare.

154 ***Sample size***

155 Three hundred and seventeen respondents (female, 58%; n = 183; male, 42%; n = 134) ranging
156 from 18 to 60+ years of age completed the questionnaire. Approximately 11% held PhDs and
157 14% held lower postgraduate degrees, 56% completed undergraduate education while secondary
158 (8%), primary (2%) or other (10%) education comprised the remaining 20%. The majority of
159 participants grew up in rural settings (63%), followed by urban (35%) or other (3%), such as
160 mountainous regions or areas under development. Our sample included 22 of the 34 provincial-
161 level administrative units (PAU) with 97% of respondents reported to be still living in China at
162 the time of the study. While participants were asked their current residence at provincial or city
163 level, 18 responded China (unspecified), and therefore the total PAUs present in the study may in
164 fact be more than the confirmed 22. The remaining 3% reported moving to the UK, Spain and

Canada. Non-pet owners accounted for the majority of our respondents' pet ownership status (80%), while those with pets reported 92% as domestic and 8% as exotic.

Data analysis

We used a Principal Component Analysis (PCA) to reduce the variables related to perceived uses of animals. We ran multiple Generalised Linear Models to test the influence of demographic variables (age, sex, pet ownership, education, urban or rural upbringing and where they are located now at a provincial level) and other variables (acceptability of exotic pet ownership and awareness of exotic pet ownership) on several dependent variables derived from the questionnaire related to the perceived use of animals, emotions animals could express, and pet awareness, interactions and acceptability of ownership. We fitted the dependent variables to binary logistic, ordinal logistic, or linear responses depending on the type of the variable. We ran all the statistical analysis via IBM SPSS 25 software, and significance was accepted when $P < 0.05$ in a two-tailed test (Field 2013).

To test for mediation effects between variables we used structural equation modelling (SEM) via IBM Amos 25 software. In this analysis, we used acceptability of exotic pet ownership, awareness of exotic pet ownership, know someone who bought exotic pets, pets express emotions, and exotic pets make people happy as both dependent and independent variables, mediating the variables 'bought wild pets' and 'looked for pets in markets/via the internet' to determine the causal determinants of exotic pet-keeping. We used maximum likelihood estimation and bias corrected 95% confidence intervals to calculate model parameters. We tested all the possible models that included the listed variables and selected the one with the best goodness-of-fit. We assessed the goodness-of-fit of our model by Chi-square test, root mean square error of approximation (RMSEA) and comparative fit index (CFI; Hooper *et al* 2008; Zhang *et al* 2014).

Results

Perceived uses of animals

The results of the PCA (Table 1) were saved and used as new variables that we called Utilitarian use, Humanistic use, and Dominionistic use based on Kellert categories. Perceived Utilitarian use was influenced by sex, with males (β = 0.29 [± 0.11]) having higher scores, and education, with people holding a PhD (β = 0.92 [± 0.23]) having higher scores (Table 2). Perceived Humanistic use was influenced by education, with people holding an undergraduate university (β = 0.39 [± 0.19]) or Masters (β = 0.67 [± 0.23]) degree showing higher scores (Table 2).

Table 1 Results of the PCA on the answer to the question related to the perceived use of animals. PCA components were then associated to Kellert categories (Kellert 1985, 1993). In each component the three highest values are indicated in bold.

Table 2 Significant results from the generalised linear models by demographic variables. Data are based on questionnaires from 317 Chinese nationals across 22 provincial-level administrative units. Only significant results based on p-value < 0.05 are reported.

Perceived emotional capacity of animals

Participants largely expressed that animals are capable of emotions (97%). Happiness was the most commonly cited emotion (20%), followed by sadness (19%) and anger (18%). Participants reported animals capable of loneliness in 1% of responses, and empathy and grief in 13% each. Participants unaware of exotic pet ownership believed that animals are capable of empathy

211 (estimated marginal mean = 0.52 [± 0.09]) more often than participants aware of exotic pet

ownership (estimated marginal mean = 0.21 [± 0.11]) (Table 2). The estimated marginal means of participants who believed animals to be capable of happiness, sadness, and anger were higher in participants with primary education than in participants with higher degrees (Table 2). Males believed that animals are capable of sadness and loneliness (estimated marginal mean = 0.27 [± 0.10] and 0.55 [± 0.10], respectively) more often than females (estimated marginal mean = 0.11 [± 0.05] and 0.41 [± 0.10], respectively) (Table 2).

Thoughts, behaviours and interactions with exotic pets

For prior interaction and behaviour regarding exotic pets, the majority of respondents reported they had not thought about buying an exotic pet (94%), searched for exotic pets (98%), purchased an exotic pet (98%) or played with an exotic pet (91%). Responses were similar when asked if they knew someone who had thought about buying an exotic pet (93%) or purchased an exotic pet (81%). When asked if respondents had a photograph taken with an exotic pet, the majority again reported 'no', but less often compared to other interactions (79%; 'Yes' n = 67).

Acceptability of exotic pet ownership negatively influenced the variables: awareness of exotic pet ownership, thought about purchasing exotic pet, bought exotic pet, know someone who thought about purchasing exotic pet, and know someone who bought exotic pet (Table 2). Age negatively influenced the acceptability of exotic pet ownership, while pet ownership had a positive influence on it (Table 2).

The goodness-of-fit for the SEM model was high ($\chi^2 = 9.094$; $P = 0.246$, RMSEA = 0.03, CFI = 1.00). The model indicates that the variable 'bought exotic pet' can be explained by other covariates, such as acceptability of exotic pet ownership ($\beta = 0.038$ [± 0.009]; $P < 0.001$), awareness of exotic pet ownership ($\beta = 0.004$ [± 0.002]; $P = 0.037$), and looked for pets in markets/via the internet ($\beta = 0.009$ [± 0.001]; $P < 0.001$). Participants looked for pets in

markets/via the internet when they knew someone who bought exotic pets (β = 0.038 [± 0.009]; $P < 0.001$), when they thought it is more acceptable to keep exotic pets (β = 0.024 [± 0.009]; $P < 0.001$), when they were more aware of exotic pet ownership (β = 0.006 [± 0.002]; $P = 0.002$), and when they thought pets express emotions (β = 0.007 [± 0.003]; $P = 0.010$). (Figure 1). Other casual relationships are present between acceptability of exotic pet ownership and awareness of exotic pet ownership (β= –0.064 [± 0.015]; $P < 0.001$) and between acceptability of exotic pet ownership and know someone who bought exotic pets (β = 0.047 [± 0.023]; $P = 0.041$). Participants who answered that exotic pets make people happy were less aware of exotic pet ownership (β = –0.035 [± 0.011]; $P = 0.001$) and found it less acceptable to keep exotic pets (β = –0.103 [± 0.046]; $P = 0.025$).

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Figure 1 Representation of the structural equation model to understand the determinants of wildlife trade in China. All the possible models that included all the variables were tested and the model with the best goodness-of-fit selected. * $P < 0.05$, ** $P < 0.01$.

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When asked of their awareness about exotic pet ownership, 93% of respondents reported they were not aware of people owning exotic pets. Despite this large percentage self-reporting that they were unaware of exotic pet ownership, 60% of respondents viewed such ownership as unacceptable, and a combined 10% responded 'very acceptable' or 'acceptable.' Following this, participants provided a response as to what they considered the term exotic pet to encompass. Sixty-six participants responded with examples that included reptiles (eg crocodile, snake; 36.3% of the sub-sample), big cats (eg tiger, lion; 33.3%), other large mammals (eg elephant, panda; 33.3%), other small mammals (eg squirrel, civet; 13.4%), non-human primates (species not specified; 12.1%), birds (species not specified; 9.1%), and fishes (3.0%). There was a significant

negative relationship between listing non-human primates and acceptability of exotic pet ownership ($\beta = -2.462$ [$\pm$ 0.852]; $P = 0.004$). There were no other significant relationships between the listing of the other animal types and acceptability of exotic pet ownership.

Discussion

Perceived uses of animals

Chinese perceptions of animal use in our study could be condensed into two Kellert (1984, 1985) categories: utilitarian — benefiting humans, and humanistic — bringing companionship and love. These categories support previous findings that Chinese people's attitudes towards animals are becoming more humane (Carpenter & Song 2016) while still encompassing utilitarian attitudes (Smith *et al* 2017). We expected the order to be reversed, with humanistic attitudes more prevalent than utilitarian; this was not the case. To a lesser extent, perceptions of animals also included dominionistic attitudes. Our study further demonstrated Carpenter and Song's (2016) notion of ecologically focused attitudes, as 'other' responses pertaining to uses of animals included harmony or ecological balance.

In contrast to Zhao and Wu (2011), and Su and Martens (2017), we did not find an effect of age of respondents regarding their perceptions of animal welfare and pet ownership. This result may be due to the structure of our data, using more age classifications than Su and Martens (2017). Alternatively, it is possible that the options we provided for use of animals were extensive enough that age groupings overlapped and its effect as a variable was lost. Gender has been previously suggested as significantly affecting the attitudes towards animals within the Kellert categories, with males more likely to express dominionistic, ecologistic, naturalistic and utilitarian attitudes than females (Kellert & Berry 1987). Our study delivered similar results. Such gendered attitudes towards animals have been suggested as stemming from the Taoist and

Confucian beliefs of *yang*; a masculine, domineering characteristic that has remained a part of daily Chinese life (Jenkins 2002) Further, higher education attainment has also been suggested as explicitly affecting attitudes concerning animal use (Davey 2006) and animals' existence for human use (Zu *et al* 2005), a finding echoed by our study's results. It has been suggested that those with higher education form the main consumer base of wild animals, but this was only the case among respondents with both higher educational backgrounds and higher income (Zhang & Yin 2014). Future studies should include questions on income and socio-economic class in addition to the demographic variables measured in our study. This would help provide further insight into the connection between education, income and resulting viewpoints.

Animals' emotional capacity as perceived by respondents

Our findings support those of Packer *et al* (2014), with 97% of respondents agreeing that animals are capable of a variety of emotions, both simple (ie happiness, sadness) and complex (ie empathy). We found education level affected the emotions that respondents believed animals could display. Specifically, those only educated to primary school level responded significantly more that animals could express happiness and sadness. One possible explanation is the important role animals play in children's stories (Sharama 2017). Thus, from a young age, children are presented with depictions of animals displaying a range of emotions either visually or verbally. The view of animals as emotive beings may assist in gaining public support for conservation efforts using emotional and sensitive imagery or messages. This view has been suggested as also giving rise to new issues, since anthropomorphising feelings and motivations have prompted unprecedented interspecies relationships, ie using animals for social exchanges, including pet ownership rather than monetary or utilitarian purposes (Serpell 2003).

Males in our sample responded that animals were capable of loneliness and sadness more often than females. Considering Chinese males may follow masculine norms and suppress their own

negative emotions (Cai *et al* 2016), these results were notable. There is some argument that the processing of perceptions of emotions can occur without the perceiver's awareness (Ruys *et al* 2010). As Chinese males are more adept at suppressing their negative emotions, they may be more aware, consciously or unconsciously, of the expressions that need to be muted in order to successfully mask their negative state. Some domesticated animals have evolved facial muscles and expressions to mimic those of humans (Kaminski *et al* 2019). Although women have been found to be more sensitive to negative stimuli (Gohier *et al* 2013), this does not preclude that men may be attuned to finer movements that indicate negative emotional states.

Thoughts, behaviours and interactions with exotic pets

Our respondents described little interaction with exotic pets and most interactions were influenced by the acceptability of exotic pet ownership. The positive feelings a prospective pet owner has when viewing an animal often ensures they will purchase it (Endenburg & Bouw 1994). Once a person becomes a pet owner, they have more opportunities to connect with animals than non-pet owners (Su & Martens 2017); their status as a pet owner may also allow for more opportunities to connect with a variety of pets, both exotic and non-exotic. The possible interactions with exotic animals may result in owners thinking the animal is not a suitable pet or that, as an owner, they could not provide the appropriate care for an exotic pet. It is also possible that pet owners were sufficiently satisfied with their chosen animal they did not feel the need to explore other pet options. We found pet owners more often owned domestic pets and were significantly less likely to have thought about or purchased an exotic, thus domestic pet owner satisfaction seems to be a reasonable explanation for our findings

As observed by Su and Martens (2017), respondents' increasing age can have a significantly negative relationship on their positive attitude towards animals. We found an effect of age only on the perceived acceptability of exotic pet ownership, which was only present among the younger respondents and did not influence overall purchase of exotic pets. The relationship between exotic pet acceptability and age may be a result of the technology and social media posts that have enabled new access to the purchase of any type of pet and more exposure to those who have purchased exotic pets compared to previous generations (Marano *et al* 2007). It would therefore be worthwhile to include conservation education early on and throughout adolescence to show the 'dark side' of exotic pet ownership and reduce the number of young people viewing exotic pet ownership as acceptable (Moorhouse *et al* 2017).

The purchase of exotic pets may relate to what an owner wants to achieve by owning a pet (Klaphake & Smith 2002), such as the pleasure of owning an animal as a personal object or the idea that ownership of an exotic pet will improve their social status (Duarte-Quiroga & Estrada 2003). While these findings propose the motivations that lead to exotic pet purchase, our findings suggest a process that buyers demonstrate before making their final purchase. Prior to purchasing an exotic pet, our respondents indicated they had a previous awareness of exotic pet ownership practices, they accepted exotic pet ownership and had searched either online or in marketplaces for an animal. These three variables provide potential new areas for conservation, such as introducing a warning for those searching online for exotic animals that certain animals are not suitable pets, or that their purchase may promote cruel practices like illegal trade. One such warning has been introduced to the online social networking site *Instagram* (Daly 2017), though the impact this has had on public perceptions and actions to our knowledge has not been measured.

Our study demonstrates that while people may consider themselves uninformed about animal matters such as exotic pet ownership, when asked about the term, they can freely provide

numerous examples. These are frequently defined as non-native, non-traditional pets or both (Marano *et al* 2007). Often, such animals include 'domesticated exotic animals' such as small mammals like ferrets, rabbits, guinea pigs, canaries, box turtles and fish, but may also include 'wild exotic pets' like primates or large cats (Hess *et al* 2011). Many of the animals included in the 'domestic exotic animals' have been argued to be artefacts of classification as their presence as pets is not necessarily unusual in modern times (Hergovich *et al* 2011). The examples provided in this study included horses, rabbits, birds (including chickens), turtles, lizards, snakes (including vipers and pythons), chameleons, fish, and spiders. The variety and number of examples provided by respondents suggest those in China have a good understanding of the term 'exotic pet.'

Moreover, the examples provided by respondents appear to be significantly related to their acceptability of exotic pet ownership, particularly among respondents that provided non-human primate examples believing exotic pet ownership to be more unacceptable. As many primate species found throughout China are listed on the National Key Protected Wild Animal List (State Forestry and Grassland Administration Government Website 2018) and have been included on this list since 1989, respondents may be more familiar with the state protected status of non-human primates. It would be beneficial to examine the extent to which they separate their examples into 'acceptable' and 'unacceptable' exotic pets, since this distinction would clarify understanding of the term 'exotic pet' and the division the public make between 'acceptable' and 'unacceptable' exotic pets.

Conclusion

China's role, both as an importer and exporter of live wildlife and wildlife parts (Smith et al 2017) and its status as a biodiversity hotspot (Myers et al 2000) has catapulted it to centre stage in the wildlife trade debate. Chinese discourse on animal rights and welfare has sparked interest in understanding the attitudes held by mainland citizens, resulting in contradictory

conclusions between the groups of people surveyed (i.e. NGO campaigns; Carpenter & Song 2016; rural villagers and farmers; Wang et al 2006; Liu et al 2011; Xu et al 2015). We explored the role of animals in China under a variety of contexts, asking survey participants their perceived uses for animals, the emotional capacity of animals, thoughts and interactions with exotic pets and potential drivers of exotic pet trade. Our study provides new insight over a larger geographical range and among members of the general public. By identifying the factors that ultimately lead people to purchase an exotic pet, legal or not, preparing and presenting behaviour-specific interventions for prospective buyers is possible. Providing conservation and legal information may deter prospective buyers, educate undeterred buyers, or spark a conservation interest in those learning about the origins of exotic pets and their captive welfare. Finally, this deeper understanding of Chinese attitudes towards animals and drivers of the exotic pet trade within China may enable conservationists to devise effective conservation campaigns for threatened species commonly found in TCM and international wildlife trade

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Table 1. Results of the PCA on the answer to the question related to the perceived use of animals. PCA components were then associated to Kellert categories (Kellert 1985; 1993). In each component the three highest values are indicated in bold.

Original Variables	**Component 1 (Utilitarian use)**	**Component 2 (Humanistic use)**	**Component 3 (Dominionistic use)**
Food	0.701	-0.094	**-0.354**
Fashion	0.745	-0.112	0.116
Labour	**0.774**	0.031	-0.231
Transportation	**0.783**	-0.018	-0.129
Medicine	**0.791**	-0.150	-0.078
Companionship	0.181	**0.738**	0.025
Status symbol	0.424	-0.080	**0.732**
Health and Happiness	0.353	**0.550**	0.001
Income	0.645	-0.230	-0.103
Socialisation	0.518	0.172	**0.506**
Other use	-0.042	**-0.583**	0.169

Table 2. Significant Results from the generalised linear models by demographic variables. Data are based on questionnaires from 317 Chinese nationals across 22 provincial-level administrative units. Only significant results based on p-value < 0.05 are reported.

Dependent Variable	**Independent Variable**	**Slope (b)**	**Std. error**	**Wald χ^2**	***p***
Perceived uses of animals					
Utilitarian Use	Sex (*Male*)	0.29	0.11	6.74	0.009
	Education *(PhD)*	0.92	0.23	15.62	<0.001
Humanistic Use	Education (*Bachelor*)	0.39	0.19	4.01	0.045
	Education (*Master*)	0.67	0.23	8.47	0.004
Emotions animals could express					
Empathy	Awareness of exotic pet ownership (*No*)	1.41	0.67	4.39	0.036
Happiness	Education (*Primary*)	3.07	1.26	5.99	0.014
Sadness	Sex (*Male*)	1.06	0.36	8.51	0.004
	Education (*Primary*)	2.36	1.11	4.40	0.036

Anger	Education (*Primary*)	3.74	1.34	7.83	0.005
Loneliness	Sex (*Male*)	0.55	0.26	4.55	0.033
Pet awareness, interactions and acceptability of ownership					
Awareness of exotic pet ownership	Acceptability of exotic pet ownership	-0.81	0.23	12.21	<0.001
Acceptability of exotic pet ownership	Pet ownership (*Yes*)	0.79	0.28	8.04	0.005
	Age	-0.49	0.09	27.20	<0.001
	Awareness of exotic pet ownership (*No*)	-1.90	0.51	13.71	<0.001
Thought about purchasing exotic pet	Pet ownership (*Yes*)	-1.83	0.62	8.77	0.003
	Acceptability of exotic pet ownership	-1.35	0.31	19.19	<0.001
Bought exotic pet	Pet ownership (*Yes*)	-2.12	0.97	4.73	0.030
	Acceptability of	-1.07	0.45	5.53	0.019

	exotic pet ownership				
Know someone who thought about purchasing exotic pet	Acceptability of exotic pet ownership	-0.61	0.19	6.27	0.012
Know someone who bought exotic pet	Acceptability of exotic pet ownership	-0.33	0.15	4.79	0.029
Played with exotic pet	Awareness of exotic pet ownership (*No*)	1.65	0.63	6.73	0.009

Figure 1. Representation of the structural equation model to understand the determinants of wildlife trade in China. We tested all the possible models that included all the variables and selected the model with the best goodness-of-fit. *p < 0.05, **p < 0.01