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The Modern Zoo: Demographics and Perceptions of Two International Groups of Zoo Staff

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Abstract: Characterising the people that work in zoos is a key element of understanding how zoos might better contribute to conservation activities. The purpose of this study was to investigate demographics, early life experiences and perceptions of zoo staff to the role of the modern zoo. This paper reports the key characteristics and qualitative themes emerging from study of international (European and Chinese) zoo professionals. Semi-structured telephone interviews were conducted with eight Chinese and eight European zoo staff about aspects of zoological animal welfare, conservation and zoological practices. These qualitative data were thematically analysed, and themes generated. This paper describes interviewee demographics and two themes relating to 'early life influences' and 'the role of the modern zoo'. This analysis indicates that demographic data and early life influences of zoo professionals were broadly similar between two culturally diverse regions, but that their views on the role of the modern zoo differed, particularly in terms of their perceptions of conservation activities, with European interviewees focussing on biodiversity conservation, and Chinese interviewees focussing on animal protection.

Keywords: zoo; conservation; demographics; education; China; animal welfare



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1. Introduction

Modern zoos have evolved considerably from the menageries of the past, and in many societies around the world, zoos are expected to contribute significantly to conservation, public education, and recreational activities [1–3], as well as to promoting good standards of captive animal welfare [4,5]. The role of the modern zoo continues to evolve globally, with increasing research and professional guidance being generated from zoo associations such as the World Association of Zoos and Aquaria [6,7]. Within Europe, the EU Commission is undertaking a Regulatory Fitness and Performance Programme (REFIT) of the EU Zoos Directive in collaboration with the European Association of Zoos and Aquaria (EAZA) and other stakeholders, to evaluate whether existing EU regulation of zoos is fit for purpose [8]. In particular, the role of zoos in providing good standards of zoo animal welfare is increasingly discussed [9–11].

Conservation and public education are also well-recognised responsibilities in the modern zoo and prominent themes in many zoo mission statements, with many modern zoos contributing directly to conservation activities [12,13]. However, it has been suggested that zoos could do more work in this area [13]. Interactions with zoo staff may result in deeper visitor engagement in conservation topics [1], highlighting the importance of

zoo staff understanding of conservation and the fostering of conservation culture across zoological institutions.

Animal welfare and biodiversity protection legislation, and zoo licensing requirements vary around the world and may not always support the activities of modern zoos. In addition to these external influences, good animal welfare and conservation practices may be driven by internal zoo culture [4,6,13–16] and this has been shown in other industries. For example, in the farm sector, industry-specific culture may supersede regional/geographic cultures and understanding this is helpful in improving farm animal welfare [17]. International conservation guidance for zoos exists, e.g., [7], but such guidance may not be available to all zoos due to political or linguistic barriers. One of the primary challenges to promoting the responsibilities of the modern zoo internationally, is that the demography and perceptions of zoo professionals to the role of the zoo have not been characterised. Without understanding the characteristics and perceptions of staff that work in zoos, it is challenging to effectively identify specific cultural attributes or any anthropogenic or demographic barriers to achieving the aims of the modern zoo.

Thus, it is clear that animal welfare and conservation activities are key activities in the modern zoo, but what is less clear is how the staff working within zoos understand and perceive these activities, and whether there is a common understanding of these terms to zoo staff globally. This gap in the literature presents a research problem that this study aims to address. This study selected two diverse regions (China and Europe), both with zoo membership associations focussed on conservation, education and welfare (European Association of zoos and Aquaria and Chinese Association of Zoological Gardens), but representing culturally, politically and linguistically diverse populations, to examine the similarities and differences in the perceptions of zoo staff to the role of the modern zoo.

The aim of this study was to investigate demographics, early life experiences and perceptions of zoo staff to the role of the modern zoo using a qualitative methodology. The objectives were to identify key themes emerging from discussions with Chinese and European zoo staff on the early life experiences which may have influenced their career choices, and their perceptions of the role of the modern zoo. This information has utility in better understanding how international conservation guidance may be directed or interpreted, and in identifying gaps in knowledge that may be addressed through future educational initiatives.

2. Materials and Methods

This study forms part of a larger body of work, the aims of which were to ascertain the opinions and experiences of zoo staff in Europe and China to a range of zoo animal welfare and zoo practice issues, and to understand their perspectives on what might be needed in terms of zoo animal welfare education for zoo staff. Ethical approval for this project was obtained from the Royal (Dick) School of Veterinary Studies' survey group at the University of Edinburgh.

Interview script development was informed by a review of the literature which elucidated factors which may influence or correlate with an individual's attitudes to animals, animal welfare and/or conservation issues. These included factors such as pet ownership [18,19], gender [19,20], diet choices [20,21], watching documentaries [22,23] and visiting zoos [23–25]. Additional data informing the script development were acquired from the outcomes of online and face-to-face surveys of international samples of zoo staff from a range of job roles (keeper to director) and countries. These staff either attended educational workshops on zoo animal health and husbandry in Europe or China (n = 73) or completed a voluntary response survey within a massive open-access online course (MOOC) on animal behaviour and welfare (n = 30). These surveys examined respondent's perceptions of their educational needs relating to zoo animal welfare and ethical issues. The literature review and survey data were triangulated and, in conjunction with the research aims, informed the themes within the interview script. The interview script was structured

in three sections: 1. demographics and zoo perceptions, 2. animal welfare knowledge and education, and 3. controversial zoo practices.

An interviewee sampling matrix (Table 1) was developed by analysing organisational charts from a number of zoological collections and identifying categories of staff within the zoological collection who, through their work have a potential impact on animal welfare. A maximum purposive sample was selected to ensure representation of different job roles within the zoo community and to ensure the purposeful collection of useful data from participants with a good understanding of the issues within the interview script. Maximum purposive sampling is type of non-probability sampling. Purposive sampling is employed to sample a particular type of respondent within a sampling frame, and maximises information-rich sampling within a study [26–28]. Interviewees were recruited from professional networks (colleagues, membership associations, etc.) and comprised living collection zoo employees working in zoos across Europe (EU), or zoos in the People's Republic of China (CN).

Table 1. Matrix of maximum variation purposive sample of European (EU) and Chinese (CN) interviewees. Each interviewee was anonymised via a unique identifier representing the region of origin combined with a number indicating the chronology of interviews (1–8).

Purposive Category	China Interviewees (CN)	EU Interviewees (EU)
Director	CN7	EU7
Management/curator	CN2 CN5	EU5
Veterinarian	CN6	EU3
Technical (e.g., biologist and training coordinator)	CN1 CN3	EU1 EU4 EU6
Team leader of keepers/Senior keeper	CN4	EU2
Keeper	CN8	EU8

Informed consent was obtained from all interviewees. The interview script was translated by a Chinese colleague into simplified Chinese characters and then back translated to English by a second Chinese colleague and reviewed by the interviewer for accuracy to ensure that when delivered in Chinese, the translation would be accurate. The interview was delivered by telephone from the Chinese script directly to the Chinese interviewee via a translator who conducted all of these interviews. Responses to each question were verbally translated by the same translator during the interview, and the responses audio recorded in English. The European pilot was delivered by telephone in English and the data audio recorded and then transcribed in English. The interview script was first piloted with two subjects (CN1 and EU1). The interview scripts were then refined to reduce question numbers as the interview duration was deemed to be too long (over 40 min), and minor edits in format and syntax were made to the script to reduce the need for any verbal clarification. However, the content of the interview script was not substantively changed after piloting (Supplementary Material).

All interviews were conducted by telephone using the methodology described for the pilot interviews, and whilst following the scripts, interviewees were encouraged to expand on points of interest—for example where questions might be answered 'yes' or 'no' (e.g., have you received any specific training for your job in the zoo?) interviewees answering in the affirmative were then asked to give examples, or if an interviewee expressed a particular viewpoint, they would be asked 'why?'. Interviews were recorded by Dictaphone and recordings of interview responses were transcribed professionally (University Transcriptions, TP Transcription Limited, UK) and responses were cleaned, with contextual information added in square brackets to ensure clarity of meaning. For

example, when answering a question such as ‘what do you understand by the term animal welfare?’ the interviewer may respond with ‘it is . . . xxxx’. In this context, square brackets may be added to clarify the context of the answer, e.g., ‘it [Animal welfare] is . . . xxx’. Care was taken to ensure that at no time was the meaning of the text changed, nor were any errors in grammar or syntax corrected. Transcribed interview data were cross-checked against the original audio recordings for accuracy. Interviews continued until data saturation (the point at which no new codes emerge) was reached.

Data were separated into European and Chinese datasets. Each interview script was coded using NVIVO 11 (QRS International, London, UK) with both *a priori* codes derived from research questions, and coding of emergent themes arising from the decontextualised interview data. Coding comprises three main stages: (1) immersion, where the researcher begins analysis early in the data collection process by listening to audio and/or reading transcripts, and using free-association thinking or ‘memos’ (memoing) to ensure familiarity and then to generate insights and connections between the data; (2) reduction, where the research data are reduced and organised into categories, usually through the creation of ‘nodes’ or ‘codes’ “the most basic segment, or element, of the raw data which can be assessed in a meaningful way regarding the phenomenon” [27]; and (3) interpretation, where data are reorganised and re-contextualised in a way that meaningfully describes the themes generated [29]. One script from each region was coded by a second researcher to cross-check the codes generated.

After this within-case coding process, each dataset was coded by interview question (across-case) to compare responses between interviewees. Themes were formed by the inductive grouping of Codes from within-case and across-case coding, and code contents were iteratively reviewed and re-checked to ensure they fit within the emerging themes.

The pilot interview data were analysed in the same way at the end of this process and the responses found to be consistent with other responses within their datasets and thus they were included within the sample.

3. Results

The Eight interviewees were interviewed from each of the two regions (China and Europe). Each interviewee represented a different zoo. Demographic characteristics are presented below. Interviews lasted between 25 and 45 min, and all interviewees answered all questions posed. Thematic analysis identified twelve overarching themes. The themes relating to 1. The early life experiences of zoo staff, and 2. The role of the modern zoo, are reported below with illustrative quotes.

Zoo staff demographic characteristics:

Demographic data for each interviewee are summarised in Tables 2 and 3. In China, four female and four male zoo employees were interviewed from all categories within the purposive sample matrix. All interviewees had the same dietary preferences (ate meat and fish as part of their diet), and all except one (CN1) had owned pets. All except two (CN1, CN6) visited zoos as children, and all except two (CN7, CN8) watched wildlife documentaries as children.

Table 2. Anonymised demographic characteristics of interviewees in China. CN = China), numbers 1–8 in chronological order of interview. ✓ represents an affirmative response to the survey item whilst ✗ represents a negative response.

China						
ID	Sex	Location	Eats Meat and Fish	Owned a Pet	Visited a Zoo as a Child	Watched Wildlife Documentaries as a Child
CN1	Female	Nanjing	✓	✗	✗	✓
CN2	Male	Tai Yuan	✓	✓	✓	✓
CN3	Female	Beijing	✓	✓	✓	✓
CN4	Male	Chengdu	✓	✓	✓	✓
CN5	Male	Beijing	✓	✓	✓	✓
CN6	Female	Fuzhou	✓	✓	✗	✓
CN7	Male	Xi’Ning	✓	✓	✓	✗
CN8	Female	Chengdu	✓	✓	✓	✗

Table 3. Anonymised demographic characteristics of interviewees in Europe. EU = Europe), numbers 1–8 in chronological order of interview. ✓ represents an affirmative response to the survey item whilst ✗ represents a negative response.

Europe						
ID	Sex	Location	Eats Meat and Fish	Owned a Pet	Visited a Zoo as a Child	Watched Wildlife Documentaries as a Child
EU1	Female	Ploesti, Romania	✓ (selectively)	✓	✓	✓ (after age 13)
EU2	Female	Copenhagen, Denmark	✓ (selectively)	✓	✓	✓
EU3	Male	Barcelona, Spain	✓	✓	✓	✓
EU4	Female	Female, Netherlands (from UK)	✗	✓	✓	✓
EU5	Female	Female, Riga, Latvia	✓	✓	✓	✓
EU6	Male	Canterbury, UK	✗	✓	✓	✓
EU7	Male	Edinburgh, UK	✓ (selectively)	✓	✓	✓
EU8	Female	Athens, Greece (from Poland)	✓	✓	✓	✓

In the European sample, five females and three males were interviewed. Six interviewees ate meat and fish, but three of these interviewees caveated their responses by indicating that they were selective about the type or quantity of meat and fish consumed (EU1, EU2, EU7). Two interviewees (EU4, EU6) were vegetarian. All EU interviewees had owned multiple pets, and all visited zoos and watched wildlife documentaries as children. All interviewees discussed how they had come to work in the zoo industry (including educational experiences).

3.1. Early Experiences of Zoo Staff

3.1.1. Affinity with Animals

An affinity with animals and an appreciation for their emotional capacity was a key subtheme that emerged within interviewees' narratives. In fact, a desire to want to work with or help animals, an interest in animals or a love for animals was mentioned by all interviewees regardless of region. For example, interviewees described how early life experience of 'seeing animals in cages' provoked an emotional response and empathy towards zoo animals, and how they themselves perceived that zoo animals have an emotional capacity:

"... in my communication with keepers, they say that they can read something through animals' eyes" (CN7)

"Even before I think I really actually knew what was going on, I just found it very bizarre that people would want to keep animals in cages and I always found it very sad ... " (EU4)

3.1.2. The Influence of Zoos in Childhood

Visiting zoos as children had a variety of influences on the different interviewees. Most interviewees had visited zoos as children (6/8 CN, 8/8 EU) and described a range of experiences from being unable to remember anything through to inspiring their career choice. The two respondents who had not visited zoos as a child were Chinese—in both cases, the interviewees lived very rurally with no local zoos accessible. Interviewees

identified the influences (if any) that visiting zoos as children had had on them and their career choices. Chinese respondents only reported either positive or no effects from visiting zoos as children, whereas European respondents reported both positive and negative impacts.

“25 years ago it was big animals in small cages, yeah, and that kind of, I just found that sad, and I know it sounds a bit profound, but always thought I want to do something to help this.” (EU4)

“Positive, to be honest. I mean, it was my first touch with the wildlife, so it was something that I enjoyed very well.” (EU8)

“This is the reason I came to work in the zoo.” (CN5)

Some interviewees (5/14) reported that they were too young to remember visiting zoos as children or that they did not feel that the experience had influenced them at all. Three European interviewees suggested instead that time spent in nature had influenced their career path, rather than visiting zoos.

“... it [the zoo] was not nice memories, most of my memories for attachment for nature are from the wild.” (EU5)

This interest in spending time in nature was not something that arose during interviews with Chinese interviewees, but instead it was their interest in animals that had influenced their career choice.

“Most important thing is my interest in animals since I was a child, and my major was animal science in university.” (CN5)

“This [visiting zoos as a child] has very little influence because I was too young.” (CN2)

3.1.3. The Impact of Wildlife Documentaries in Childhood

Conversely, watching wildlife documentaries as children (6/8 CN, 8/8 EU) had generated almost universal feelings of curiosity and interest about the lives of animals amongst interviewees.

“I have been very curious about all kinds of animals since then.” (CN4)

“Well I just wanted to be around animals, I loved animals.” (EU2)

Watching wildlife documentaries as children seemed to influence the career choices of the interviewees to a greater extent than visiting zoos with four of the interviewees (two CN and two EU) mentioning this influence on their chosen career path.

“Thought animals are mysterious so I was interested in it since then, so I had the ambition to work with animals.” (CN1)

“I think that had quite a big influence. I watched quite a lot. It was one of the main things that made me want to work with animals.” (EU6)

Interviewees across both regions also indicated that watching wildlife documentaries had triggered an interest in in situ protection of free-ranging wildlife, something that is an essential component of the work of modern zoos.

“[watching generated] a longing for the wildlife to be in the wild” (CN5)

“Still, real life is in wild, not in the zoo.” (EU5)

One European interviewee had not watched wildlife documentaries until she was a young teenager (13 years old) due to political instability in her country of origin, and one of the two Chinese interviewees had no access to a television.

3.1.4. Educational Influences

In terms of their education prior to the zoo, all respondents had received university education with two European respondents also undertaking formal professional training (the Diploma in the Management of Zoo and Aquarium Animals, Sparsholt college, and the Danish Zookeeper training school). Chinese interviewees had generally received no specific professional training for their role in the zoo, though all had attended university with six studying animal science degrees and two studying veterinary science (although only one interviewee worked as a vet). All interviewees across both regions had studied in biological, veterinary, psychological, or environmental disciplines and then come to work at the zoo due to their long-term interests in animals and natural history.

“I came to the zoo mainly because major was relevant to my animal management major.” (CN2)

“I studied beavers as a child. Also as a teenager, well, not studied, but was involved in project. Then after graduating I was offered a position in Institute of Biology and then it was not interesting, so . . . [I came to the zoo].” (EU5)

3.2. Perceptions of Zoos

Whilst the demographic and early life experiences of zoos and wildlife documentaries were broadly similar, the Chinese and European interviewees generated different themes in terms of their perceptions of zoos, what is important to the modern zoo, and what sort of activities comprise ‘conservation’.

3.2.1. The Evolution of Zoos (EU)

Interviewees from Europe reflected on the changing role of zoos in society in a way that Chinese interviewees did not. Several European interviewees mentioned uncomfortable memories of zoo visits as children, and expanded upon these memories and thoughts in later questions. The zoos of childhood were described as ‘dated’ and ‘homespun’ or ‘a black place’ with ‘animals in cages’.

“ . . . when I came into zoos, they were relatively homespun, dated organisations, yeah. I better stop there.” (EU7)

“The zoo back then was sort of I don’t know, at a different level of understanding what a zoo should be—they were still referring to the zoo as a museum with live animals.” (EU1)

Some of the concerns about the standards of animal care in zoos seemed to change over time as the interviewees became more familiar with the work of zoos, and of course all interviewees ended up working in zoos.

“ . . . as an environmentalist we had very strong eco activities, so the zoos for us, it was like in the black place. But then slowly, slowly reading about zoos and about different conservation projects and stuff, I changed my mind, or I gave it another opportunity.” (EU8)

Interviewees described how zoos had changed over time and the importance of gathering information and knowledge in progressing zoo animal care and conservation activities.

“using the information that we have to provide help and encourage others to move forward with us in both the care for animals and environment.” (EU3)

“At least people understand what a zoo should be even if now they are not what they should be, at least they know what they should be.” (EU1)

Education, and conservation were emphasised as priorities for the modern zoos and the importance of education that generated behaviour change was also recognised.

“[we’re] trying to create an emotional connection between themselves and the animals, which hopefully will, in turn, foster behavioural changes, . . . reducing impact on those animals in the wild.” (EU6)

“I think that people connect better to wildlife, seeing the animals up close, feeling them smelling them, I think it’s very important that they have this close experience.” (EU2)

Conservation was a particularly important focus for zoo staff in Europe and words such as ‘sustainability’, ‘safeguarding’ and ‘preservation’ were used when discussing zoological activities.

“I think the important thing to do in conservation is to make the people aware of the animals . . . and make people care about their environment in the nature and we don’t ruin them.” (EU2)

“it is providing an environment where a viable population can be sustained.” (EU4)

Overall, EU zoo staff were able to reflect critically on historical practices and experiences of zoos, but this had not dissuaded them from working in zoos themselves, and interviewees emphasised the importance of animal care, conservation and visitor education in modern zoological gardens.

3.2.2. Conservation Is Care (CN)

Chinese interviewees presented a similar perspective on the importance of education and conservation to the role of modern zoos.

“Just as WAZA says the main responsibility is conservation and education and I totally agree with this.” (CN5)

Chinese respondents also talked more about animal rescue and protection, and discussed the increasing importance of animal welfare in the role of Chinese zoos.

“rescuing animal and providing proper environment for animals in zoo and trying their best to make the animal back to its natural status.” (CN2)

“Animal welfare is also part of zoo’s purpose, zoos have to improve animal welfare in order to achieve their purpose.” (CN7)

Chinese interviewees also interpreted their responsibilities in terms of conservation activities rather differently, with a much bigger focus on providing for animal needs, offering choices, and keeping animals happy as key elements of zoo conservation work. This is markedly different to the European focus on sustainability and protection of biodiversity.

“not only putting animals in a zoo and keep them healthy and happy, it also means letting more people know how to protect species.” (CN6)

“Conservation is care and help.” (CN8)

“Most important to give free choices, chances to make their own choices and enough space to live naturally and exhibit natural behaviours, food drink and security and safety.” (CN4)

This focus on animal protection filtered through the interviewees definitions of the term ‘conservation’ with Chinese concepts of conservation seeming to extend to a feeling of responsibility to ensure that animals were ‘safe’ and ‘secure’.

“zoonotic disease control, maybe it is included in safety.” (CN1)

“Safety first, and then, consider animals nature in our work.” (CN8)

In addition to this focus on safety and protection, Chinese interviewees also mentioned breeding as a key part of conservation in Chinese zoos.

“Increase the publics’ knowledge about animals as well as awareness of animal protection and assist the breeding of some endangered wildlife.” (CN3)

Whilst educational responsibilities were mentioned alongside breeding and care activities, these seemed to be based primarily on the assumption that observation of animals would be educational rather than a deeper understanding of developing empathy or changing visitor behaviours as shown by European interviewees.

“Display to the public and educate the public, these are the main two.” (CN1)

“Providing the opportunity for visitors to observe animals in a certain small range.” (CN6)

Interestingly, no Chinese respondents discussed *in situ* conservation, reintroduction programmes or habitat protection, but only discussed habitats or naturalness in the context of the challenges of providing for zoo animals in the captive setting. The main priorities for conservation in Chinese zoos seem to be providing safe environments for zoo animals, rescuing wild animals and then protecting them in the zoo, and breeding zoo animals. All of these activities focus primarily on sustaining the population of captive zoo animals and improving animal welfare, rather than on wider activities that would be considered as typical conservation activities in European zoos.

4. Discussion

It is well established that staff working in Western zoos should have positive attitudes towards their animals [14,30], and the literature mostly supports this in practice in Western zoos [31–33]. To date, there is no literature supporting the attitudes of Chinese zoo staff towards their animals. This study presents the first evidence of the importance of zoo animal protection and care to Chinese zoo staff’s perceptions of conservation and the role of the modern zoo. This is important as positive attitudes towards animals has been identified as a key component of good stockmanship and empathy towards animals may confer greater care towards those animals [30].

Interviewees demonstrated many similarities despite their diverse cultural and geographic backgrounds. For example, most interviewees had owned pets, visited zoos as children and watched wildlife documentaries as children, indicating commonalities in lifestyle and interests despite holding a variety of different roles within zoos and growing up in different geographic and cultural locations. Where differences did exist in these factors, the interviews revealed that this variation was mostly due to logistical constraints (rural location, no television, political instability, etc.) and that these respondents still indicated early interests in animals, and had owned pets. Responses to dietary preferences did vary by region, with European respondents showing more ethical discomfort in terms of consuming meat and fish, and commenting that they ate these products selectively, or preferred to produce their own. These comments indicate that these interviewees have a level of moral discomfort with default dietary meat consumption, but did not elucidate whether that discomfort was animal related or environmentally motivated, as the literature suggests that either of these motivations may influence dietary preference [34]. Chinese respondents all ate meat and fish and did not volunteer any additional thoughts or concerns about their dietary choices. This may reflect a lack of animal welfare assurance schemes, a lack of societal awareness of farm animal welfare, or different availability of food choices [35,36].

The literature suggests that women tend to demonstrate stronger emotional and empathetic responses towards animals than men [18,37–39]. Whilst this study did not measure empathy or specific attitudinal dimensions, it did generate consistent responses indicating interest in and empathy for zoo animals across both male and female interviewees, with concern shown from European respondents for the historical conditions of zoos, and a current focus on caring for and protecting zoo animals amongst Chinese interviewees. Pet ownership in childhood may have a positive impact across both Western and eastern cultures on attitudes to animal welfare [18,40] and it is possible that this factor could have

influenced the interests in animals shown by the interviewees across both regions, as all except one (CN1) had owned pets.

Both visiting zoos and watching wildlife documentaries have been suggested as factors which may influence the development of attitudes towards wild animals [22,23]. The study reported here also supports this literature, with the majority of interviewees across both regions mentioning empathetic responses or curiosity towards animals, particularly as a result of watching wildlife documentaries. Wildlife documentaries were cited as influencing career choice by interviewees from both China and Europe. This is interesting as the impact of wildlife documentaries is fairly under-researched and exploring this relationship further may help us to better understand the inspiration for people to engage with the work of zoos.

In contrast, there is often strong messaging from zoos about the work that they do on inspiring engagement in conservation, even though historically there is limited evidence of this. Similarly, this study found that visiting zoos did not always generate positive attitudes from interviewees, it does seem to have sparked empathy towards zoo animals in some European interviewees, but had no impact, or a negative impact on others. The variability of responses may reflect the diversity in the quality of animal exhibitions and visitor experiences in different zoos depending on time of the visit and the geographic area. The influence of zoo visitation on zoo visitors does vary in the literature depending on factors such as exhibit design, staff–visitor interaction, specific educational interventions, and visitor-animal interactions [1,2,41,42]. A study by Reade and Waran showed that visitors to a zoo generally had more positive opinions on the welfare of zoo animals than non-zoo visitors [43]. However, this study indicates that zoos may generate a range of responses from younger visitors, both positive and negative, but that both types of experience may influence empathy development towards animals in these visitors, and influence them to work in zoos. Exploring these influences more deeply may give us more insight into what drives people to want to work in zoos, and how their motivations may influence the care of zoo animals.

Time in nature was also mentioned as important in influencing their work by three EU interviewees despite not being a specific question in this interview, and time in nature has been suggested to be important for healthy attitudinal development in children [44]. Childhood experiences with the natural world and free-ranging wildlife have been shown to strongly predispose adults to be tolerant of wildlife [45], and a rural upbringing alongside childhood pet ownership was shown to influence career choice in veterinary students [46]. This study aligns with those findings. This study suggests that early life experiences that drive empathy towards animals such as pet ownership, time in nature or watching of wildlife documentaries may potentially inspire the choices of zoo staff to work in zoos, and that visiting zoos as children may generate a range of responses depending on the individual experience.

Different subthemes emerged from the two geographic regions during the discussions on the roles of zoos. European interviewees focussed on the evolution and improvements of European zoos over time, and the range of conservation and education activities they engage in to inspire changes in visitor attitudes and behaviour, and to safeguard sustainable populations and biodiversity protection. Conversely, Chinese interviewees focussed on keeping animals safe and happy in the zoo, providing for their needs, breeding them and exhibiting them to the public.

These differing subthemes have likely emerged from the differing stages European and Chinese zoos are in terms of ‘zoo evolution’ [47,48]. Whilst accredited European zoos have emerged from the challenges of wild-sourcing of animals, set up collaborative breeding programmes (EAZA Ex Situ Programmes) to ensure sustainable populations, and are encouraged to engage in in situ conservation activities, these developments are in their infancy in China. The fact that all interviewees have ended up working in zoos despite some of them feeling uncomfortable about zoos when younger perhaps reflects that standards of zoo animal care, and the role of the zoo in European society, have evolved over

their lifetime. Similarly references to changing human behaviour within public education in zoos indicates the increasing engagement of zoo staff in social and educational science, and an awareness of the complex relationship between engagement, education and human behaviour, something which is very different to the 'traditional' exhibition/entertainment role of zoos [49].

There was a similar focus on the terms 'conservation' and 'education' in the modern zoo from Chinese interviewees, and this indicates that there is at least some common understanding of the responsibilities and role of zoos in society between China and Europe [4,5]. However, the understanding of these terms seemed to differ regionally. In China, wild-sourcing of zoo animals including chimpanzees, elephants and cetaceans commonly occurs (author observation, HB), and upon arrival at the Chinese zoos, the necessary husbandry expertise, veterinary care, and nutritional provisions may not always be available (author observation, HB). This lack of effective husbandry expertise and veterinary care generates animal health, welfare, and life-support challenges, which may explain the focus of Chinese interviewees on animal safety, providing care, and encouraging breeding to try and establish more sustainable animal sourcing as core aspects of conservation activity. Chinese interviewees' perceptions of zoo animals as valuable and at risk from potential dangers such as injury, disease, fire, escape or death, and may reflect both the monetary value of the animals sourced from overseas, and the challenges Chinese zoos face in providing appropriate nutrition, veterinary care and husbandry resources to zoological species (*pers.comm.* Zhang 2014). Interestingly, the focus on *ex situ* animal protection as conservation may also have been influenced by Western interventions. A study by Askue et al. [50] focussed on delivering animal protection conservation messaging to Chinese zoo educators in order to address a perceived need in education on animal sentience awareness in the Chinese public.

The use of the term 'conservation' to represent quite different activities between the two regions indicates that even though similar terminology may be used around the world, there is not always cultural equivalence in understanding what those terms mean, and in this situation it appears that the term conservation does not have cultural equivalence between Europe and China. This has significance when zoological organisations develop global guidance such as [7] as universal guidance may not meet the needs of diverse populations.

This diverse population was selected as differences in attitudes to animals [18,40,51,52] and cultural educational challenges [53,54] are documented between Eastern and Western populations. Similar differences are indicated in this study, as despite similar backgrounds in terms of education, pet ownership, and job roles, the two populations had different views on activities comprising 'conservation', demonstrating a lack of cultural equivalence of this term.

This study has a number of limitations. As an exploratory qualitative study generalisability of findings may be limited. Whilst efforts were made in purposive sampling and in interviewing until data saturation occurred, to ensure that comprehensive data were captured, the small sample and recruitment of interviewees through professional networks and zoological associations may mean that the zoo staff willing to be interviewed on this topic are not representative of zoo staff generally. Despite this, this study does give insight into the attitudes of a little-studied population to the role of the modern zoo and generates themes which could be further explored in future quantitative or qualitative studies.

5. Conclusions

Demographic commonalities exist within this diverse international cohort of zoo staff, but, despite this, perceptions on the role of the modern zoo, and specifically on what comprises conservation activities differ between the two regions, indicating a lack of cultural equivalence of this term. There is a focus on sustainable populations and biodiversity protection in Europe, and a focus on keeping animals safe and happy in the zoo, providing for their needs, breeding and exhibition of animals to the public in China.

These differences may reflect the different roles and expectations of zoos in geographically and culturally different societies and indicate that universal guidance or conservation strategies may not meet the needs of all zoos.

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