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Is Tickling Torture? Assessing Welfare towards Slow Lorises (Nycticebus spp.) within Web 2.0 Videos

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ABSTRACT
Videos, memes and images of pet slow lorises have become increasingly popular on the Internet. Although some video sites allow viewers to tag material as 'animal cruelty,' no site has yet acknowledged presence of cruelty in slow loris videos. We examined 100 online videos to assess if they violated the five freedoms of animal welfare and whether presence or absence of these conditions contributed to the number of thumbs up and views received by the videos. We found 100 videos showed at least one condition known as negative for lorises, indicating absence of the necessary freedom; 4% showed only one condition, but in nearly one-third (31.3%) all five chosen criteria were present including: human contact (57%), daylight (87%), signs of stress/ ill health (53%), unnatural environment (91%) and isolation from conspecifics (77%). The public were more likely to like videos where a slow loris was kept in the light or displayed signs of stress. Recent work on primates has shown that imagery of primates in a human context can cause viewers to perceive them as less threatened. Prevalence of positive public opinion of such videos is a real threat towards awareness of the conservation crisis faced by slow lorises.

The ability of media to influence audiences and their attitudes is widespread, ranging from environmental awareness [Mankoff et al., 2007; Smith and Broad, 2008; Waters and El-Harrad, 2013] to consumer behaviours [Keum et al., 2004; Freeman and Chapman, 2007] and people's perceptions of wildlife. Displaying images of exotic pets across popular media outlets can increase the demand for these animals, and this has been directly linked to increased wildlife trade in exotic species [Sollund, 2011]. This phenomenon has been reported for species displayed in traditional media, such as films and television [Jones and Sinclair, 2008; Malamud, 2010; Powell, 2010]. For primates, research carried out using images of chimpanzees *(Pan troglodytes)* in different settings, including anthropogenic and natural environments [Ross et al., 2008, 2011; Schroepfer et al., 2011], showed that people observing these apes alongside humans or in human-dominated environments tend to see them as less threatened and as potential pets. Leighty et al. [2015] found a similar pattern for some other monkeys and lemurs, and suggested that the entertainment industry should monitor its use of non-human primates.

Many major international multi-media companies have taken on board the potential conservation costs of using non-human primates as performers [Leighty et al., 2015]. A rising alternative to traditional films and television are social media sites such as YouTube, Vimeo and Facebook, whereby users not only upload content, but police such content as well [Freeman and Chapman, 2007]. Waters and El-Harrad [2013] point out the importance that online social networking can play in informing users about primate conservation, but that care needs to be taken in how that message is delivered. An image, meme or video of a threatened species going viral has the chance to bring the species' plight to millions, but at the same time the context of the image may result in public

perception that the animal is not threatened or that it makes a suitable pet [Nekaris and Starr, 2015]. Such is the case in point with a group of nocturnal primates from Asia - the slow lorises (*Nycticebus* spp.). All species are listed by the IUCN Red List as Vulnerable, Endangered or Critically Endangered, and illegal trade in slow lorises as pets is rife. As a consequence, in 2007, all species of *Nycticebus* were listed in CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) Appendix I, thereby banning all commercial trade [Nekaris and Nijman, 2007]. Despite improved legislation and trade regulations, slow lorises are still heavily exposed to illegal harvesting for the pet trade, partly evidenced by their regular appearance on international social media sites [Nekaris et al., 2013a].

In recent years, slow lorises have become a particularly popular phenomenon on Internet videos [Nekaris et al., 2013a]. The trigger of their sudden pervasiveness on social media was a video of a pet pygmy loris *(Nycticebus pygmaeus)* in an anthropogenic setting that gained a positive acceptance by the general public [Nekaris and Campbell, 2012], resulting in numerous polls naming it in the ‘top ten' pets [Travis, 2014]. YouTube, the most popular video-networking site [Cheng et al., 2007] and the third most visited website overall [Alexa Traffic Rank, 2014] enables users to watch, share, rate and discuss the videos and their content [Cha et al., 2007]. This particular site, often criticised for its loose regulatory policy [Kim et al., 2010], enables users to flag those videos with inappropriate content, such as animal abuse [Nekaris et al., 2013a], described as a threat to the animal's welfare [Agnew, 1998; Sollund, 2011]. Despite the high likelihood of the slow lorises observed in these videos having been acquired illegally, and public outcry that these videos violate animal welfare, petitions to remove them from YouTube have been unsuccessful [Nekaris and Campbell, 2012].

Defining what comprises animal abuse can be difficult, especially for species such as slow lorises that are generally unknown to the public. Schuppli and Fraser [2000] developed a framework which considers an animal's ‘five freedoms'. After species-specific physiological and ecological requirements have been identified, this framework can be used to measure the welfare of animals, including exotic ones, kept as pets [Engebretson, 2006; Soulsbury et al., 2009]. The factors include freedom (1) from hunger, thirst and malnutrition, (2) from disease and injury, (3) from physical forms of discomfort due to inadequate thermal, resting or other environmental conditions (responsible humans being obliged to provide adequate environmental housing), (4) from fear, distress and negative psychological states, and (5) to carry out normal behaviours. Failing to provide these freedoms raises considerable ethical concerns and can be used to determine the suitability of an animal as a pet [Schuppli and Fraser, 2000].

The development of social media sites, where users can instantly upload and share home videos of their pets, and viewers can like, dislike and comment on their content, has offered a systematic and novel way of analysing species' welfare and the public's attitude towards their treatment. With these developments in mind, we set out to examine the provision of 5 freedoms to pet slow lorises present in online videos, whilst considering the viewer's attitudes towards the conditions shown in these videos. We analysed data on 5 welfare conditions present or absent in the videos in relation to the number of likes in order to understand what factors contributed to the public's perception of ‘cuteness' and to gauge their understanding of animal abuse. We discuss the possibility for conservation and welfare organisations to use social media to alter people's views through education and knowledge leading to a transformation of the ‘slow loris phenomenon'.

Methods

Between February 27 and March 6, 2014, we systematically searched the social media sites YouTube, Tudou and Youku for individual slow lorises in private ownership using the search terms ‘slow loris', ‘slow lemur' and ‘pet slow loris', and the same terms written in Cyrillic, Katakana and Kanji. We searched until we could find no new results. In order to examine individual lorises, we excluded videos of the same individual loris(es) uploaded by the same person, choosing the first video by the uploader that appeared in our search. We found a total of 123 videos on YouTube (n =

112), Tudou (n = 7) and Youku (n = 4). We focused our research solely on videos of pet slow lorises and excluded those that were of individuals in sanctuaries, rescue centres, zoos, and being used as photo props; thus, of the 112 YouTube videos, we excluded 23. URLs of the videos at the time of the study are included in the Appendix. Slow lorises were kept in pairs 22 times, yielding a total of 122 lorises. Following Nekaris and Bearder [2011] and Rode-Margono et al. [2014], we recorded species and age class (adult, juvenile, infant) of the slow lorises to determine the diversity of individuals being kept as pets.

To determine the audience and their attitudes, we recorded the country from which the video was uploaded, the upload date, number of views, number of thumbs up (likes) and number of comments. Because of a large number of nationalities, we grouped countries that contributed less than 5 videos into a single group 'other'. We used number of views and number of comments as popularity indicators [Shifman, 2012]. Views are the most direct measure of popularity while comments represent a measure of additional attention to a video. Thumbs up reflect a degree of participation and the attitude toward the video content [Madden et al., 2013]. In order to take into account that some videos could have more thumbs up because they had been uploaded longer or viewed more, we divided the number of thumbs up by the number of views to create a 'thumbs up score'.

To analyse the welfare of the slow lorises being kept as pets, we recorded the presence (=1) or absence (=0) of 5 different conditions (table 1; fig. 1). We chose these 5 conditions to serve as indicators of fundamental slow loris environmental and behavioural needs (table 1). Each condition was recorded as present irrespective of the length or frequency of occurrence, while the condition was absent if it was unobserved throughout the video. Each video was given a rank based on the number of conditions present, i.e. 2 different negative conditions is rank 2. Rank 0 indicates that the basic needs of the slow loris are met, while rank 5 indicates the opposite. We recorded the duration of each video to establish its effect on the occurrence of welfare conditions.

Table 1: A description of each of the 5 conditions and the reasons why they indicate basic environmental and behavioural needs, and psychological well-being of slow lorises

Condition	Description of the condition	Indications that basic needs and psychological well-being of slow lorises are not met
Human/ non-conspecific contact	The individual was either touched, stroked, manipulated, poked, or otherwise handled or held by a human; the individual was placed on or near a domestic pet such as a cat, dog or guinea pig	Exotic animals are generally unfamiliar with human contact, and forced proximity or handling can cause stress or discomfort [Morgan and Tromborg, 2007]
Daylight	The individual was observed in daylight or artificial daylight conditions	Slow lorises are nocturnal primates and being subjected to daylight conditions, without reversing their light cycle or providing adequate night lighting, neglects behavioural needs and will impact their health [Fitch-Synder and Schulze, 2001; Fuller et al., 2013]
Signs of stress or ill health	The individual showed signs of stress. This included defence threats, crouching, folded mouth, freezing, stereotypic behaviour, attacking (i.e. biting), scratching, scream or chitter vocalisations [Fitch-Snyder and Schulze, 2001]. Signs of ill health included obesity (as measured by physical fat folds on the loris' body), open wounds, hair loss, cut and/or swollen hands, infections due to teeth being clipped	While stress can be considered a necessary requirement in predator avoidance, chronic stress can cause stereotypic and abnormal behaviours, and implicate health and psychological well-being [Morgan and Tromborg, 2007]
Unnatural conditions	Natural substrate or vegetation were not evident throughout the duration of each video; unnatural food was presented to the slow loris (rice, sweets, excessive fruit)	Slow lorises are arboreal primates that move by slow climbing and bridging, and have home ranges between 2 and 35 ha [Nekaris and Bearder, 2011]. Being housed in small cage enclosures, subjected to an environment which contains no substrate or hiding places, does not meet basic behavioural ecological needs [Fitch-Synder, 2008]. Slow lorises are highly specialised exudate-consuming primates; zoo husbandry manuals recommend 100 g of food in the diet per day; thus large bowls of sugar-rich or other inappropriate foods can cause ill health and death [Fitch-Synder and Schulze, 2001]
Isolation	Additional slow loris individuals (irrespective of species) were not present throughout the duration of each video	Primates are social animals [Cowlishaw and Dunbar, 2000] and suffer greatly when they are deprived of social interaction or stimuli [Mallapur and Choudhury, 2003; Honess and Marin, 2006]

Fig. 1 Visual examples of when the 5 conditions were marked as present (left column) or absent (right column). Conditions are by row (an image can contain more than 1 condition): human contact;

daylight; stress or ill health; unnatural conditions; isolation from conspecifics. Images taken from a selection of the videos included in the data collection.

We used a Pearson's correlation to examine the relationship between the duration of the video and the number of conditions, and used a generalised linear mixed model. We fit the data in a generalised linear mixed model using a gamma distribution and logit function for the response

variable ‘thumbs up'. We used as predictors several variables, including presence of light, human contact, stress behaviour and unnatural conditions; whether the animals were solitary, and whether the animals were young (infant, juvenile) or old. We implemented analyses in SPSS 21.0 software [Field, 2013].

Results

Species and Video Origin

The 100 videos viewed contained 122 individual slow lorises. Bengal slow loris (*N. bengalensis;* 37%) and pygmy slow loris (*N. pygmaeus;* 39%) occurred most frequently, followed by greater slow loris (*N. coucang;* 16%), Javan slow loris (*N. javanicus;* 4%) and Philippine slow loris (*N. menagensis;* 3%) as well as one purported hybrid (1%). Slow loris videos were predominantly uploaded from 5 countries, China (15%), Thailand (15%), Vietnam (7%), all slow loris range countries, Japan (28%) and Russia (12%). For China, 6 of the 15 individuals recorded were non-native species, and for Thailand, 5 of the 15 individuals recorded were not native to the country. With regard to age class, most slow lorises were adults (55%), followed by juveniles (23%) and infants (22%).

Attitudes and Welfare

We found that all 100 videos showed at least 1 negative condition, with 4% showing only 1 condition, but with nearly one third (31%) showing all 5 negative conditions. Presence of conditions included human contact (57%), daylight (87%), signs of stress and ill health (53%), unnatural environmental conditions (91%) and isolation from conspecifics (77%). In 49% of the videos at least 1 of the slow lorises present was obese. In 8 separate videos infections were observed around the muzzle of an individual, indicating that teeth had been removed, and 3 animals exhibited open wounds consistent with being bitten by a conspecific. The average duration of the videos was 129 ± 92.9 s; there was no relation between the duration of the video and the number of conditions shown (Pearson correlation: $r = 0.16$, $p = 0.10$).

Table 2 shows the number of thumbs up and comments made on videos relative to condition. The variables used to predict the number of thumbs up resulted in a highly significant model (overall generalised linear model: $\chi^2 = 1{,}136.32$, d.f. = 7, $p < 0.001$). Thumbs up significantly increased in the presence of unnatural light, displayed stress and adult animals, while thumbs up significantly decreased if the animals were kept in unnatural conditions (table 3).

Table 2

Number of videos containing 1 or more of the 5 conditions, with the average and maximum number (in brackets) of thumbs up and comments for videos in each category: two thirds of the videos contained 3 or more negative conditions, and also received the majority of comments and thumbs up

Conditions present	Thumbs up	Comments
1 (n = 4)	46.75 (156)	16.00 (54)
2 (n = 13)	12.7 (38)	13.38 (74)
3 (n = 26)	309.4 (3,912)	102.04 (1,318)
4 (n = 26)	20.85 (248)	6.81 (38)
5 (n = 31)	2,171.13 (41,591)	303.17 (8,217)

Table 3

Parameters estimated for the generalized linear model on the characteristics of slow loris videos that received more thumbs up

Response variable	Fixed factors	Estimate	SE	p value
Thumbs up	human contact	0.250	0.332	0.453
	light condition	–2.738	0.477	<0.001
	stress	–0.981	0.342	<0.005
	solitary	–0.062	0.400	0.877
	age	–0.651	0.328	0.047
	unnatural conditions	1.348	0.623	0.030

Discussion

Our investigation highlights the inadequacy of the nutritional, physical, environmental, psychological and behavioural care of slow lorises when kept in private households. Their recent popularity in the media, particularly social media sites, has exposed them to a receptive public, increasing their desirability as a pet despite the general public's lack of understanding of their needs. This concept is highlighted here by the fact that elements in the videos clearly contrary to good welfare were met with statistically more thumbs up by the viewing public. This follows on from research by Nekaris et al. [2013a] who found a general positive attitude towards a single viral video of a pygmy slow loris being tickled (also included in this study) that violated all 5 freedoms, yet many of the 12,411 commenters described the animal as 'cute' (23%) or posted their desire to own one as a pet. In another viral video of a slow loris eating a riceball, also violating all 5 freedoms, Vazquez [2014] found that 37% of 5,619 individuals who commented thought that the loris was cute, with 6.3% expressing their desire to have one. In both of these studies, the majority of individuals liking and commenting on the videos were from Europe and North America. Thus, the potential for a sick, scared or stressed slow loris to appear as the norm exists even in cultures that are more likely to know about and adhere to the 5 freedoms. Here we discuss further how the 5 freedoms are consistently violated in online slow loris videos, yet how the presence of such videos might nonetheless be used to improve loris welfare and conservation.

Freedom from Hunger, Thirst and Malnutrition

Slow lorises in the videos we analysed were fed an inadequate diet; fruits were the predominant food source, followed by inappropriate items such as milk, soup and rice, with no evidence of gum or other plant exudates. The provision of a correct diet relates directly to the health and subsequent welfare of any animal, including primates [Hevesi, 2005; Soulsbury et al., 2009]. In the case of slow lorises, ecological studies consistently show that their natural diet predominantly consists of gum, nectar and insects, with fruit consumed rarely [Starr and Nekaris, 2013]. Research also shows that incorrect diet in captivity, particularly one high in sugar, is strongly linked to obesity and development of illnesses such as diabetes and dental problems [Fitch-Snyder and Schulze, 2001; Fuller et al., 2014]. In nearly half of the videos, slow lorises were obese, which can lead to sickness and a shortened life span [Fuller et al., 2013]. The evolutionary developments of a species' natural diet reflect its physiological, morphological and behavioural adaptations, and matching these needs as much as possible in captive environments is imperative [Hevesi, 2005; van Nijboer et al., 2007; Clauss et al., 2008]. For instance, calcium intake through unrefined gum from wild tree species is important for slow lorises to balance out other nutritional content, and consuming protein is linked with reducing the risks of renal impairment [Fitch-Snyder and Schulze, 2001; Cabana and Plowman, 2014].

Pet primates are commonly fed inadequate diets. In Mexico City, provision of coffee, tobacco and marijuana to pet primates is standard practice [Duarte-Quiroga and Estrada, 2003], and in Isla de Margarita, Venezuela, pet capuchins *(Cebus apella margaritae)* consume the same diet as their owner, including meat, fish and bread [Ceballos-Mago and Chivers, 2010]. To some individuals, it

would seem customary to take into account species-specific requirements of exotic pets prior to their purchase, yet according to Drews [2003] a more cognitively demanding process is required to consider an animal's needs and subsequent welfare. This is typically acquired through common sense and additional information, including knowledge about conditions humans are unable to perceive with their limited sensory abilities. As the concept of animal welfare is a relatively new one in Asia [Li, 2006; Zhang et al., 2008], from where more than half our videos were uploaded, and animal protection is lagging behind that of many western countries [Irwin, 2003], the ability of owners to care for exotic pets is particularly reduced. While commercially produced primate food, also observed in the videos, provides a form of sustenance, it does not provide the necessary nutrients to remain healthy [Crissey and Pribyl, 1997]. Unavailable or inaccurate information, particularly within cultures that may not have high awareness of basic animal welfare requirements [Drews, 2003; Hevesi, 2005; Ceballos-Mago and Chivers, 2010], further reduces people's ability to keep slow lorises in the correct manner.

Freedom from Disease, Injury or Pain

Visible injury and wounds were more difficult to quantify across videos, but included evidence of teeth being clipped, wounds caused by venomous bites from conspecifics, cuts, swollen hands from gripping wire, loss of an eye, fur loss or unhealthy fur. All of these conditions are likely to have derived from living in inadequate environments and anthropogenic settings. Duarte-Quiroga and Estrada [2003] similarly found 30% of pet primates suffered from burns, electric shocks, cuts whilst living in private households, and death by strangulation, asphyxiation and electrocution was also reported. Slow lorises are venomous [Nekaris et al., 2013b], and in order to prevent the venomous bite, owners may remove a slow loris' anterior incisors, canines and caniniform premolars. The process is normally conducted without anaesthesia and causes considerable pain and infection that remains visible around the muzzle [Nekaris et al., 2013a, b]. If slow lorises retain their teeth and bite a conspecific, this causes cellulitis with subsequent necrosis around the wound as well as severe discomfort, illness and even death [Streicher et al., 2008; Fuller et al., 2013; Nekaris et al., 2013b].

Unlike physical wounds and obesity, symptoms of disease and sickness are often subtle and not easily detected or understood by uninformed individuals who rely on more familiar physical signs of suffering, such as bleeding or bruising [Drews, 2003; Young, 2003]. Fraser [2009] denotes this as the human's ‘everyday' understanding of animal welfare. As Drews [2003] stated, people require additional information to comprehend and appreciate animal suffering that is not visible to the naked eye. With the increase in publicity and education on animal welfare issues, people draw on their ‘everyday' understanding of an animal's well-being and begin to question other aspects of their care, treatment and lifestyle [Drews, 2003; Fraser, 2009]. This has now been increasingly observed with animals in laboratory research and factory farming [Young 2003; Maria, 2006; Wolfensohn and Honess, 2007; Broom, 2010], zoos [Reade and Waran, 1996; Young, 2003; Fraser, 2009] and those involved in the entertainment industry [Hughes, 2001; Drews, 2003]. Nekaris et al. [2013a] conducted research into the effect that a video of a pet pygmy slow loris on the social networking site YouTube had on knowledge and awareness of the animal's ecology and illegal trade. Initially public knowledge, as assessed through the video's comments, was low. Yet after the release of a documentary that focused on slow loris ecology and showed footage of the cruelty of illegal trade, comments regarding slow loris conservation, ecology and welfare became widespread, and viewers expressing the desire to own them as pets declined.

Freedom from Physical or Thermal Discomfort

Only 8 of the videos contained a form of natural environment with suitable climbing substrates, hiding places and adequate space. Slow lorises are arboreal, tree-dwelling primates that naturally inhabit environments such as bamboo forests, mixed deciduous forests and dense shrubland [Nekaris and Bearder, 2011]. They have relatively large home ranges averaging up to 33 ha and display a range of morphological traits adapted to their habitat and locomotor behaviour [Nekaris

and Starr, 2015]. With an inability to leap, slow lorises have hands that act as clamps for grasping branches via quadrupedal climbing and bridging [Ankel-Simmons, 2007; Fitch-Snyder et al., 2008]. The replication of a habitat where their physiological and environmental specifications are met requires knowledge, time and resources, which are unlikely attributes in private households [Hevesi, 2005; Engebretson, 2006; Ceballos-Mago and Chivers, 2010]. Reinhardt [2004] emphasises that when primates are kept in cages it is almost impossible to replicate a species' natural surroundings, and even zoos struggle to provide an actively stimulating environment resembling all aspects of their wild habitat [Engebretson, 2006]. As slow lorises are particularly susceptible to environmental stressors, captive enclosures should consist of continuous pathways with differently sized branches, leafy foliage and nest boxes to provide cover and hiding places [Fitch-Snyder and Schulze, 2001]. This environment will promote activity and reduce negative impacts on their psychological well-being [Fitch-Snyder and Schulze, 2001; Fitch-Snyder et al., 2008; Streicher et al., 2008; Fuller et al., 2013].

The stress associated with being housed in non-natural environments is amplified when slow lorises are kept in conditions that disregard their most basic behavioural requirements. Despite being a nocturnal primate, 88% of individuals in the videos were observed active during daylight, a feature that was met with a statistically high proportion of thumbs up. Exposing slow lorises to light during their naturally inactive period suppresses the production of the hormone melatonin, which alters their ability to ascertain information on the time of day and year [Reiter, 1991], disrupts their circadian rhythms, inhibits activity and reproduction, and causes discomfort and stress [Fitch-Snyder et al., 2008; Fuller et al., 2013]. Our study is limited in that we cannot ascertain the specific lighting conditions individuals were kept in; however, it is unlikely that private households are able to maintain a specialised 12-hour reversed light cycle allowing for natural activity during human daylight hours. This requires 12 h of artificial light during human night hours to encourage the animals to sleep and then simulating the night with red or neutral-density filters during human daylight hours [Fitch-Snyder and Schulze, 2001; Fitch-Snyder et al., 2008]. Such requirements are not always adhered to in accredited zoos and are unfeasible in private households where considerable time, financial, knowledge and resource restrictions exist [Fuller et al., 2013].

Freedom from Fear, Distress and Negative Psychological States, and Freedom to Carry Out Normal Behaviours

In over 80% of videos, slow lorises were observed alone with no evidence of conspecifics, indicating that their normal social requirements are overlooked. Primates are highly social and suffer from extreme stress and behavioural problems when deprived of social contact with conspecifics [Mallapur and Choudhury, 2003; Hevesi, 2005]. Although slow lorises have been described as solitary, they form stable uni-male, uni-female social units with overlapping home ranges, participate in regular social interactions and regularly sleep with 2 or more slow lorises [Wiens and Zitzmann, 2003; Rode-Margono et al., 2014]. Preventing primates receiving basic social stimulation from conspecifics reduces their ability to carry out natural behaviours, causing stress and abnormal or self-injurious behaviours including rocking, self-injury and excessive locomotion [Lutz et al., 2003; Reinhardt, 2004; Hevesi, 2005; Wolfensohn and Honess, 2005; Honess and Marin, 2006].

Soulsbury et al. [2009] found that 78% of primates on sale in the UK pet trade were being sold as single individuals, and 63% were infants. Social deprivation is one of the most pertinent issues arising from isolation, impacting primate welfare. Amid these concerns, one must also consider the deep-seated and life-long behavioural implications that are strongly linked to early parental separation and deprivation from social groupings prior to maturation [Meder, 1989; Bellanca and Crockett, 2002; Lutz et al., 2003]. These include a lack of maternal competence and reproductive success [Kuhar et al., 2003; Thompson et al., 2010], reduced survival [Lewis et al., 2000], increased aggression [Meder, 1989] and fewer normal behaviours [Bloomsmith et al., 2002; Ross et al., 2003]. Similarly to Duarte-Quiroga and Estrada [2003] who found young pet primates were popular, we observed that nearly half of slow lorises in videos were juveniles or infants, some of which were only a few weeks of age. As wild slow lorises do not disperse from their natal range until about 18 months

of age, the behavioural implications for these individuals are noteworthy. Physiological and immunological issues are of additional concern [Zimmerman et al., 2011]. During offspring development, postnatal parental care is imperative. Individuals deprived of breast milk lack certain nutritional elements micronutrients and lipids, which reduce bio-active agents controlling anti-inflammatory and immunological agents, leaving individuals more susceptible to illness and disease, particularly when other aspects of their care are neglected [Goldman, 2002; Lubach and Coe, 2006; Zimmerman et al., 2011]. All of these implications are widely acknowledged, and zoological establishments are encouraging maternal care and natural grouping patterns to reduce unwanted behavioural and developmental consequences, psychological discomfort and stress [Sodaro and Weber, 2000; Wolfensohn and Honess, 2005; Porton and Niebruegge, 2006].

Despite professionals advocating the prohibition of handling slow lorises, and their high susceptibly to stress during human proximity [Streicher, et al., 2008], they were observed being physically handled in more than half of the videos. Maintaining a primates' psychological well-being in a captive environment is imperative for upholding a good standard of welfare and reducing fear or distress [Mason, 1991; Schuppli and Fraser, 2000]. Authenticating an animal's negative psychological state is challenging; however, mental suffering often manifests itself through non-normal behaviours and species-specific reactions, i.e. when slow lorises freeze when faced with fear and stress [Mason, 1991; Engebretson, 2006]. Preventing psychological stress in exotic animals is typically ensured by providing opportunities to perform basic physical and social behaviours [Woolverton et al., 1989; Morgan and Tromborg, 2007], and considering their ability to cope with improper handling and close human proximity [Hevesi, 2005; Nekaris et al., 2013a]. Many zoo-housed animals find the presence of human visitors stressful [Hosey, 2000]; Davis et al. [2005] found that spider monkeys *(Ateles geoffroyi)* had elevated urinary cortisol levels (glucocorticoid, a hormone indicative of stress) during visitation hours, and Birke [2002] observed orang-utans *(Pongo pygmaeus)* hiding and altering their behaviour with high visitor numbers. As clear outward signs of stress were observed in more than half the videos, this substantiates the susceptibility of these animals to negative psychological suffering in private households [Nekaris et al., 2013a]. In the wild, acute stress is a necessary component of natural behaviour in avoiding predators and ensuring survival, yet long-term or chronic stress resulting in prolonged periods of elevated stress hormones is known to suppress reproduction, induce life-long abnormal behaviours and increase susceptibility to illness and disease by weakening immunological functions [Broom and Johnson 1993; Morgan and Tromborg, 2007; Pirovino et al., 2011]. One of the basic differences between wild and captive conditions is that free-living animals have a choice, for instance to leave or to hide, whereas in captivity, humans either impose their will on the animal or leave it alone in inadequate, non-stimulating environments.

Conclusion

The keeping of exotic pets generates a whole host of problems with regard to the animal's welfare. We feel that our data clearly show how difficult it is for a layperson to keep a slow loris as a pet. The provision of the 5 freedoms and the environmental, behavioural and ecological needs of slow lorises in captivity considerably outweigh the abilities of uninformed individuals to provide a good standard of welfare. In an ideal world, consideration before purchasing an animal would be commonplace, and people would carefully contemplate owning exotic animals as pets. Globalised markets and media exposure of slow lorises have rendered them desirable and their purchase more straightforward. Initiatives harnessing modern technologies such as social media and networking sites should focus on educating the public regarding the deprivation slow lorises experience in private households. Increasing public understanding of their intricate needs will work to reduce consumer demand and the negative impacts of the pet trade on species' populations and their welfare.

Education and understanding of the negative impact of private captivity on slow lorises could be used to inform the general public about their conservation. The media has a strong influence on

people's attitudes towards health, consumerism and conservation issues, i.e. pro-environmental behaviours and animal protection [Holbert et al., 2003; Mankoff et al., 2007; Wright, 2010; Pearson et al., 2011]. It is also effective at communicating educational materials, and empowering the wider and international community to make a change [Smith and Broad, 2008; Aaker and Smith, 2010; Paek, Kim, Hove, 2010]. If used correctly, there is an opportunity for the media, from television to social networking sites, to be used as educational materials [Waters and El-Harrad, 2013] informing audiences of the complex needs of slow lorises and their unsuitability as pets. As people's concept of animal welfare is often based on rudimentary information or is a relatively new notion, educating the public is vital. If appropriately managed, the media can help raise public awareness and knowledge regarding slow lorises unsuitability as pets and the need to conserve wild populations, which may help protect them against illegal trade, one of the most serious threats to their survival.

Appendix

URLs of videos showing slow lorises in 2014

http://www.youtube.com/watch?v=99gYYffXvfw
http://www.youtube.com/watch?v=PQwCkvVFrmE
http://www.youtube.com/watch?v=7yko8ODJ1hY
http://v.youku.com/v_show/id_XMTIwOTA2OTM2.html
http://www.tudou.com/programs/view/L_1kE_LOY_Y/
http://www.tudou.com/programs/view/C1R0jyevEBQ/
http://www.youtube.com/watch?feature=endscreen&NR=1&v=hTNZjn0YnQs
http://www.tudou.com/programs/view/a9FvRekCGxs/
http://v.youku.com/v_show/id_XMjk4MzUzODA0.html
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