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anthrozoös

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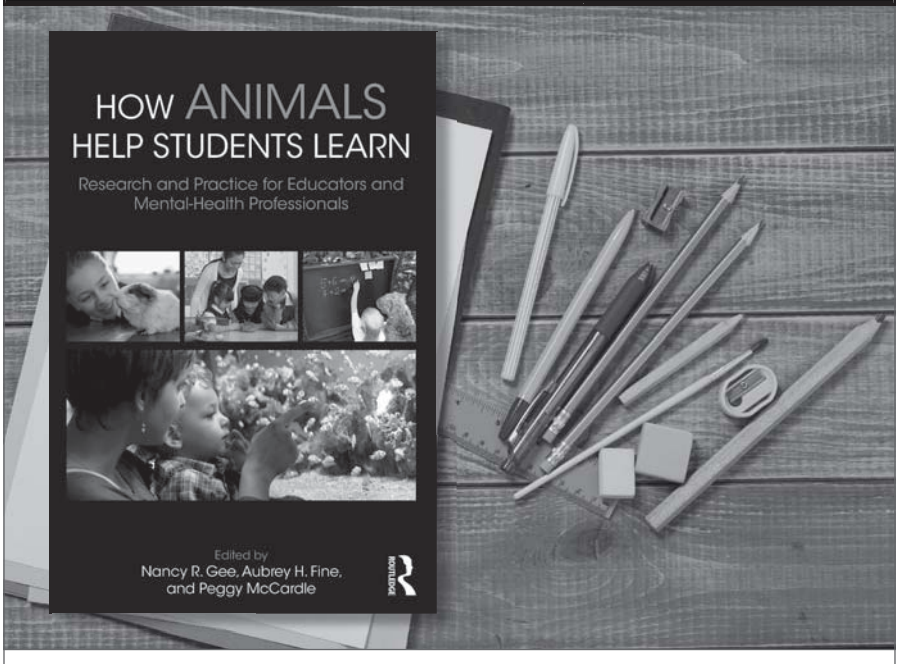

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Socio-cultural Determinants of Human–Bat Interactions in Rural Ghana

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ABSTRACT Bats are known to be a natural reservoir for a lot of disease pathogens and can spread several diseases. All 11 genera of fruit bat found in West Africa are found in Ghana, and human–bat interactions are common. However, there is a dearth of knowledge about the socio-cultural factors that shape these interactions. This paper explores the socio-cultural factors that bring humans into contact with bats. Data were obtained through focus group discussions and in-depth interviews. The findings indicate that gender, religious affiliation, and belief systems influence the interaction between humans and bats. We conclude that the hunting and consumption patterns of bats have far-reaching consequences for the transmission of bat-borne zoonotic diseases. Educational campaigns, therefore, should be intensified and, in particular, target groups that are most at risk of contracting bat-borne zoonotic diseases.

Keywords: bats, Ghana, sacred forest, socio-cultural beliefs

Over the past four decades there has been an increase in the rate at which zoonotic diseases occur in humans (Daszak, Cummingham, & Hyatt, 2000). The consequences of such outbreaks have often been devastating, threatening the already fragile economic and healthcare systems of affected countries (Pigot et al., 2014). Bats are known to be a natural reservoir for several disease pathogens, such as filoviruses (Marburg and Ebola viruses), paramyxoviruses (*henipavirus*—

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hendra and *nipah* virus), and lyssaviruses (Daszak et al., 2000; Dobson, 2005; Brook & Dobson, 2015).

All 11 genera of fruit bat that are found in West Africa are found in Ghana. The straw-colored fruit bat, *Eidolon helvum*, is especially common (Hayman et al., 2011). Large bat colonies have been found in most parts of the country, such as Accra, Kumasi, Kyebi, Afram Plains, and parts of the Volta and Western regions (Decher, 1997; Decher & Fahr, 2007; Kamins et al., 2011; Hayman et al., 2011). Human–bat interactions are common as bats are widely hunted for food and provide a source of income for many people (Decher, 1997; Hayman et al., 2011; Kamins et al., 2014; Anti et al., 2015). It is estimated that over 128,000 bats are sold each year as bushmeat in southern Ghana (Kamins et al., 2011). More importantly, several disease pathogens have been isolated in bats. For instance, the henipavirus is found in bat colonies in Accra, Kumasi, Tanoboase, and in the Volta Region. It is also present in domestic pigs (Drexler et al., 2009; Hayman et al., 2011).

The henipavirus (hendra and nipah) is especially pathological (Drexler et al., 2009). The nipah virus causes encephalitis in humans and respiratory illness and encephalitis in pigs (Looi & Chua, 2007; Luby, Gurly, & Hossain, 2009). Though there is no evidence yet for the presence of henipavirus in the general human population in Ghana, it is important that we understand the factors that contribute to human–bat interactions. Understanding the factors that put people in contact with bats is useful for mapping out how zoonotic diseases are likely to occur and who is most at risk. There is evidence to show that the 2013 Ebola disease outbreak in West Africa (Baize et al., 2014) was due to the interaction between humans and bats. Saez et al., (2015) provide evidence that the "index case" of the Upper Guinean Ebola outbreak (a 2-year-old boy) may have been playing in a hollow tree with insectivorous free-tailed bats (*Mops condylurus*) in Melinadou, SE Guinea. Similar evidence is found in the nipah virus outbreak that occurred between September, 1998 and June, 1999 in Malaysia and Singapore. In that outbreak, 265 human cases were recorded, while the pig industry was decimated (Looi & Chua, 2007; Luby et al., 2009).

Transmission of the nipah virus occurs when people come into direct contact with the saliva and droppings of the bats. In Malaysia, the existence of large commercial pig farms creates the setting for the transmission. The bats roost on fruit trees planted on pig farms. The half-eaten fruits coated with saliva and bat droppings fall into the pig stalls. The pigs eat the contaminated fruits and developed respiratory illness and encephalitis. Subsequently, farm workers at the pig farms get infected (Luby et al., 2009). The transmission is aided further when sick pigs are clandestinely sold in other parts of Malaysia (Looi & Chua, 2007). The virus spread further among abattoir workers in Singapore, who had come into contact with pigs imported from Malaysia (Looi & Chua, 2007).

In Bangladesh, the transmission from bats to humans occurs in three ways: first, through the ingestion of fresh date sap. The sap is harvested by cutting into the tree trunk where it flows slowly into a clay pot left overnight. In the night, the bats come to lick on the sap of the date palm and hence contaminate it. Transmission occurs when the fresh sap is drunk raw by people. The second route of transmission occurs when domestic animals eat half-eaten fruits dropped by bats. The domestic animals become infected and transfer the virus to other animals and then on to humans. The third pathway is when people come into direct contact with bat secretions by climbing trees which have been visited by bats (Luby et al., 2009).

In terms of hunting, recent literature suggests that men are more likely to hunt bats for food than women (Anti et al., 2015; Kamins et al., 2014; Lawson, Ayivor, Ohemeng, and

Ntiamoa-Baidu, 2016), but the factors that influence interactions between humans and bats have not been well studied. This study sought an in-depth understanding of the broad range of socio-cultural factors which underlie human–bat interactions. Specifically, we asked: What are the historical/cultural understandings of the origins of bats? What factors determine the hunting and consumption of bats?

Methods

The Study Area

The study was conducted at Tanoboase in the Techiman North District of the Brong Ahafo Region of Ghana. The Bonos are part of the Akan ethnic group which constitutes about 45% of Ghana's population. Other Akan groups include the Asante, Fante, Kwahu, Akyem, Akwapim, Ahanta, and Sehwi. They speak a mutually intelligible language called Twi. Tanoboase is a small farming community with a population of about 2,470; they are predominantly peasant farmers. The major cash crops grown are cashew nuts and mangoes (Ghana Statistical Service, 2014).

This area was chosen as the study site because the Tanoboase Sacred Grove, which covers an area of ca. 300 acres, supports a large roost of bats. The Tano Sacred Grove has great spiritual significance for the citizens of Tanoboase. The terrain of the grove comprises a thick semi-deciduous forest, large rocks, and caves which give a panoramic view of the forest. In the past, the grove served as a safe haven against enemy attacks, particularly the Asante. The grove is believed to be the earliest settlement of the Bonos and also home to Taakora, the great god of the Akan people who is believed to be the first son of the supreme god (Rattray, 1923). The Tano River takes its source from the sacred grove and runs for 400 km through five districts in the Brong Ahafo region and also in the Western region, before it enters the Gulf of Guinea at Aby lagoon in La Cote d'Ivoire (Adiyiah, Aboagye-Larbi, & Acheampong, 2013).

All activities such as farming, logging, and hunting are forbidden in the Tano Sacred Grove; people are allowed only to pick herbs there. Sacred groves are small patches of land or forests protected by religious and/or cultural agents (Nganso, Kyerematen, & Obeng-Ofori, 2012). They are believed to contain the spirits (*sunsum*) of ancestors, local gods, and other spiritual beings. They are often the sites for rituals (*mmusuyi*), prayers (*apayɛ*) to ancestors, the gods and other deities, and for other religious purposes (Sarfo-Mensah, Oduro, Antoh, & Amisah, 2010). Due to the fact that sacred groves have spiritual significance, they often are forbidden places; farming, hunting, logging, and trapping are not allowed. The picking of herbs for medicinal purposes, however, is allowed (Sarfo-Mensah et al., 2010).

Data Collection and Analysis

The data were collected through focus group discussions (FGDs) and in-depth interviews with key informants. Two FGDs based on sex were organized. The FGDs consisted of 98 females and 38 males and were facilitated by one of the researchers assisted by a research assistant. Participants were chosen through convenience sampling. The criteria for the selection of participants were that the participant should be at least 18 years old and willing to take part in the study. The discussions centered on beliefs about the origins of bats, the hunting, processing, and consumption practices, and the perceived threat of disease spillover from bats to humans. We also conducted in-depth interviews with key informants including the chief and some of his elders, one of whom was also the assemblyman[1], some members of the royal family, hunters, the sole butcher in the community, a *mallam*[2], and some fruit farmers. In all, 15 people were interviewed. The interviews lasted between 45 minutes and

one hour and took place in the homes of the participants. They were conducted with the aid of a semi-structured interview guide.

Both the in-depth interviews and the FGDS were conducted in Twi, the language the participants understand perfectly. The FGDs and the in-depth interviews were tape-recorded and then later transcribed and translated into English. The transcribed data were analyzed through thematic analysis, as described by Braun and Clarke (2006). We started the analysis by familiarizing ourselves with the data and identifying patterns. These patterns were then coded, and themes developed and were analyzed.

Ethical approval for the study was obtained from the Institutional Review Board of the Nogouchi Memorial Institute for Medical Research of the University of Ghana. Participants were informed about the study and their consent sought before the interviews began.

Results

Local Classifications of Bats

In Tanoboase a bat is known as *ampane* (singular) or *mmpane* (plural). In other Twi dialects it is known as *apan* (singular) or *mmpan* (plural) (Cansdale, 1970a). The residents identified four types of bats by the following local names: *ahwenekron* (*Hypsignathus-monstrous*, Hammer headed bat) *ampane ankasa* (literally the original or normal bat, *Eidolon helvum*, straw-colored fruit bats), *sreso ampane* (*Epomophorus gambianus*, epaulette fruit bat), *afrifraa/fredɛ fredɛ* (free-tailed bats; family—*Molossidae*). The *ahwenekron* are said to have nine noses (*Ehwene* in Twi is nose and nkron is the number nine). The participants indicated that the *ahwenekron* are uncommon, bigger in size, have a distinctive cry from other bat species and feed only in the sacred grove. Some participants indicated that they preferred this type of bat for consumption because they are more delicious. At the time of the visit, the straw-colored fruit bat was the most common species in the area, with large numbers roosting in the grove and were the ones most often consumed. The *sreso ampane*, are believed to originate from the Northern part of Ghana where the vegetation is savannah grassland. Another name given to the *sreso ampane* is *ampane kronfoɔ* (thief/criminal bat) because they are perceived to be very destructive on farms. These were not too common in the area. The *afrifraa/fredɛ fredɛ* derive their name from the fact that they are very swift and go in and out of their roost. They were found mostly in ceilings. Unlike the other species they are insectivorous, and were not consumed because they are small in size and very smelly. At the time of the study, there was a roost of these in the community day-care center.

McCaskie (1992) indicates that the Ashanti classify animals in two ways—phenomenologically and ontologically. Phenomenologically, the Ashanti translate "their sensory observations of habitat, physicality and primary behavior in animals into a set of basic discretionary categories" (McCaskie 1992, p. 223). Animals are classified according to their habitat, primary behavior, and physical appearance. We see a similar mode in the classification of bats at Tanoboase; the bats were classified based on their physical appearance, their habitat, and primary behavior. Thus, *ahwenekron* is a bat with nine noses, *ampane ankasa*, the real bats, *sreso ampane* grassland bats, also described as criminals because of their destructive nature, and *afrifraa/fredɛ fredɛ* because they move swiftly in and out of the ceilings of buildings.

Beliefs About the Origin of the Bats

There were two schools of thought about the origins of the bats in the sacred grove. One school was that the bats were brought to the sacred grove by Taakora (the deity associated

with the Tano Sacred Grove). Those who were of this view indicated that the bats were with Taakora when he moved into the forest. Others were of the view that Tano brought the bats from elsewhere to the forest, but did not know exactly where they came from and when they populated the sacred grove. Furthermore, others also believed that Tano continually adds to the bat population. One participant from the FGDs said, "Tano brings the bats from different parts of Ghana. However, as to exactly where he brings them from, nobody can tell because there are bats in northern Ghana, bats in Accra, in Kumasi and Buoyem." Others also said the bats were brought by Tano, to be used as food when the town experienced famine as a result of bushfires. However, there was no written record of famine or bushfires in the community at the time of the study. An elderly man from the royal family in the community emphasized that the bats were connected to Taakora:

> Originally, the bats were here but not in large numbers. My father, my own biological father, [he] was the person who first started to manage the forest. The forest did not only have bats but also monkeys, baboons and other wild animals. I used to go to the Tano Shrine with my father at that time.

He further explained that he and his late father, who was the previous chief of the town, used go to the forest to offer sacrifices to Tano and to take care of the place before the relocation of the shrine. The sacred grove was declared an ecotourism site in 1996 (Yeboah, 2013) and this occasioned the relocation of the shrine to its present abode within the vicinity of the chief's palace, after some rituals were performed to pacify Tano.

The second school of thought, which was also the view held by the current chief of the town, was that the occurrence of the bats is a recent event and has nothing to do with the Tano. According to this school of thought, the bats have been there for just about the last three decades, arriving around 1985. They explained that, indeed, there were a few bats in the town which previously roosted on coconut trees and around the forest. The chief of the town had this to say:

> On one occasion, I was here when somebody came and said: "Nana, I was passing by the forest and I heard noise from bats"; and then they [community] began hunting them. We don't know where the bats came from. Remember, that that place [forest] is a forbidden place. So what we saw was that the bats were there.

There are no written records on the occurrence of the bats in the sacred forest. It is possible that the bats moved into the forest when they lost their habitat elsewhere due to ravaging bushfires, which is characteristic of the area. Looi and Chua (2007) suggest that the bats that caused the nipah virus outbreak in Malaysia migrated from the forests and neighboring countries due to the severe 1997–1998 El Niño Southern Oscillation (ENSO) event. The drought destroyed the natural forest habitat of the bats and forced them to move from the forest to fruit orchards around pig farms. Ghana witnessed a long drought between 1983 and 1984. The prolonged drought caused bushfires across the country and destroyed much of the crops and vegetation (Dei, 1988; Awuah-Nyamekye, 2009). Bushfires are still common in Ghana, especially during the dry harmattan season which occurs between December and March. Since bats are known to be very mobile, and taking into consideration the fact that the sacred forest is protected, they might have migrated there when they lost their original roosting and feeding habitats, and finding a safe haven in the forest, they settled there. It must be noted, however, that although the bats roost in the sacred forest, they are not regarded as sacred animals. Also, the fact that they were believed to have been brought to the forest by the gods did not influence bat consumption by the people.

Feeding Habits of Bats

Bats normally do not feed where they roost. They are known to behave like migratory birds. They normally roost at one place and travel to areas where there are fruit trees to feed on. This is what an FGD participant said:

In the evening, around 4.00 or 5.00pm, you see the bats leaving the forest and flying over the town to go and feed. The sky becomes dark with them. At dawn, around 4.00am, they start to return. When you hear them cry and make noise, it means they are returning. By 6.00am, almost all of them have returned to the forest.

On where the bats feed, there were varied responses from participants. While a few indicated that they did not know where the bats fed, others suggested that the bats traveled to Sunyani (76 km away), Northern Ghana, and Buoyem (a village close to Tanoboase where there are bat roosts in caves). The majority of the participants, however, claimed that the bats fed on cashew farms surrounding the village. It was reported that they generally fed on fruits such as cashew nuts, pawpaw, mangoes, black plum, figs, and soursop. With regards to the eating habits of the bats, while some were of the view that the bats eat fruits, particularly cashew, on the farms where they pick them, others believed that the bats pick cashews from one farm and take them to a different place to feed. It was reported that it is common to find a huge pile of cashew nuts left by the bats on one's farm or under trees in the bushes. The participants indicated that they did not normally see bats on their farms; they only knew that the bats had been there from the left-over or partially eaten fruits and nuts left behind.

The cashew-nut farmers could not indicate exactly how much revenue is lost due to the feeding habits of the bats. Some were not even sure whether they lost any revenue at all. They explained that what they needed were the nuts and not the fruits, and since the bats drop the nuts after they have eaten the fruits, they could always collect the nuts and sell them. They believed they only lost revenue when the bats carried the fruits to another farm to eat. This was succinctly expressed by a participant in the in-depth interviews when he said: "If the bats make your cashew farm the dining hall, then you are lucky; but if they make it [the] take-away, then you are in trouble." We found only one mango farmer who indicated that the bats destroyed his fruits. He, however, could not indicate how much revenue he lost. Furthermore, some of the traditional leaders expressed concern that the bats could decimate the forest. They explained that when the bats hang on the branches, the branches do not grow again and cause the tree to die. They indicated that they had noticed that some of the trees were dying, and were worried that with time, most of the trees in the forest could die.

The farm-raiding activities of bats have been reported in Mauritania (Price, 2013). Price found that fruit bats of the genus *Pteropus* raid farms and eat fruits in people's gardens and farms. The fruits commonly destroyed by the bats were mangoes and lychees. Participants in Price's study thought that bats were a big problem to which a solution must be found.

Hunting of Bats

The bats were hunted in the sacred forest by means of a spray gun or catapult. When a shot is fired, several pellets are released which can hit several bats at a time. Bats hang together in groups, normally up to a hundred at a time. About 20 to 50 bats could be killed by a single gunshot. The bats fall to the ground and are collected and put into sacks. Those that do not die immediately are hit with sticks until dead. According to the participants, bats do not die easily; they can hold on to a branch for a long time before dying. Sometimes, even when they are dead they can remain hanging on the branch for several hours before falling to the ground. Bats

may scratch or even bite the hunters when they fall and are not dead. Sometimes, the one who kills the bat may not get the carcass immediately, but another person, who happens to be passing by at the time the bat falls could get it.

In Tanoboase, the processing of bats is done in the bushes, using fire to singe the skin and the membrane; the head also is removed. The processing is done in the bush because bat hunting is illegal and hunters are afraid that if they processed at home, the strong smell emitted from the burning fur could expose them. It was obvious that hunters were exposed to scratches and bites from the bats during hunting, and routinely to bat blood and other body fluids during processing. Similar observations have been reported elsewhere in Ghana (Anti et al., 2015).

The legality or otherwise of hunting bats in the sacred forest has not been consistent. At one point, it seemed to be legal and then was made illegal. Some participants indicated that a long time ago the hunting of bats was legal. This was when the village was devastated by wildfire. The god then gave permission for the bats to be hunted for food. However, people started killing the bats indiscriminately, forcing them to retreat into the sacred grove where there is a total prohibition on hunting and farming. At the time of the study, the hunting of bats in the forest was illegal. Those apprehended for hunting were sent to the chief's palace where they were either fined or sent to the police station at Tuobodom, about 6km away, for prosecution. They alleged that sometimes people from other villages and towns came to hunt in the forest under the cover of darkness. We were told of a man serving a two-year prison sentence for illegal hunting. To enforce the ban on hunting, the traditional authority had appointed special guards to patrol the forest. However, the guards were accused of hunting the bats themselves and extorting monies from the illegal hunters they apprehended. Nevertheless, some participants justified the actions of the guards, saying that they were not paid and were at risk of being harmed or even killed by the illegal hunters in the forest, knowing the severity of the punishment they could receive if arrested.

Though hunting is illegal, the traditional leaders could allow hunting when the bat population is deemed to have increased. In such instances, some rituals were performed. When the leaders consider that the bat population has become too high, the chief would sound the *gong gong*[3] and announce a day when any individual, who desired, could go into the sacred grove and hunt; or the chief would select a few men to go and hunt. That was the only period when hunting, selling, and processing bats were lawful.

There was, however, disquiet in the community regarding the hunting of the bats. It was alleged that the chief had given permission to one individual to hunt bats. The economic undertones arose out of the fact that the community members thought the chief and that individual were making themselves rich at the expense of the whole community. This person, they alleged, hunted bats regularly and sold them at the Techiman market and not at Tanoboase. The Techiman market is known as a hub for bushmeat, especially bat meat, in that part of the country (Anti et al., 2015). The proceeds were then shared between the two. They claimed that the individual had become rich as a result and was putting up a new house. They further alleged that this action by the chief was denying the rest of the people access to bat meat. This allegation was evident when in the men's FGDs they claimed they did not know the price of a bat because they were not sold in the town. The women, on the other hand, readily provided information on the price of bats: between one and two Ghana cedis (about US$0.30). In the FGDs, none of the male participants admitted to have ever hunted bats in the sacred forest. However, in the in-depth interviews with individual males, hunters readily admitted to have hunted bats and even directed us to other hunters.

Our findings indicate that the hunting and processing of bats were gendered—men generally hunted bats, but not women. None of the women in the study indicated that they had ever hunted bats. A few said they had picked bats from the ground before, when the bats were electrocuted on high tension cables or found in the bushes. Women did not hunt because hunting is socially defined as a masculine task. More so, it occurred in the sacred forest, and as noted by Sarfo-Mensah et al., (2010), sacred groves have the reputation of being quiet, serene, and frightening areas that possess supernatural powers and should not be profaned. It was believed that those without supernatural powers or unauthorized people, therefore, go there at their own peril, so it was unlikely for women to go there to hunt or engage in any other activity. Men were more likely to attempt to go into the forest, even when it was forbidden to do so, than women.

The gendered nature of hunting bats reported in this study is consistent with other studies (Anti et al., 2015; Kamins et al., 2014). In the study by Anti et al. (2015), the bats roosted in caves, several of which were believed to be spiritual sanctuaries. In one of the communities they studied, hunting of bats was part of the yam festival, where only women collected the night's catch. Similarly, Kamins et al. (2014) report that only two of the hunters they interacted with were women, but even these scavenged for fallen bats or helped to beat them with sticks after they fell.

Consumption Patterns

As pertains to other parts of the country (Hayman et al., 2011), bat meat is widely consumed by residents in Tanoboase. It was a delicacy in the town and this was reflected in the many nicknames given to it, for example, *dankwansre* (literally smiling in soup) or *mea ne bo*, (literally, press its chest). The participants recounted that all one has to do when bat meat is served in soup is to press its chest and the soup that has soaked in comes out, so one does not need additional soup. The most popular ways bat meat is consumed is either in soup, barbecued, roasted, or fried. It can be cooked whole or cut into two or four pieces. The participants indicated that with the exception of the head and nails, no other body part of a bat is thrown away.

Those who consumed bat meat indicated that it is more delicious than other types of meat. They attributed the delicious nature of meat to the fact that bats feed only on fruits—on "foods which are above and not foods which are on the ground." While bat meat was widely consumed, not everyone ate it. Consumption was influenced by religious beliefs, food taboos and some myths about bats. Opinions differed when it came to whether or not people from the royal family ate bat meat. While some were of the view that it was a taboo for members of the royal family to eat bat meat, others thought otherwise. An elder, whose deceased father was a chief of Tanoboase, indicated that he did not consume bat meat because it was a taboo to consume food items that belong to Tano. He intimated that it was a sign of disrespect to Tano to eat bats because the bats and other animals in the sacred grove were given to the people by the god. According to him, he had "never eaten bat meat because I am a direct son of the shrine." Another view was that bat meat was a taboo only to the *Nifahene* and not to the entire royal family or the shrine (such as the priest/priestess and those around the shrine). The *Nifahene* is the head of one of the four military wings in the Akan army. The four military wings are the *nifa* (right wing), the *benkum* (left wing), the *adonten* (front wing) and the *kyidom* (back wing), and the *Nifahene* has the responsibility of sending extra troops to the field when necessary.

Another factor that influenced the consumption of bats was religious affiliation. Muslims and Seventh Day Adventists (SDAs) did not consume bat meat. Muslims interviewed indicated that their religion did not allow them to eat bats. Islamic laws stipulate that animals to be slaughtered must be alive and healthy at the time of slaughter and that all blood should be drained from the carcass. In addition, the animal should be killed by cutting through the jugular vein, carotid artery, and the windpipe. The Muslims pointed out that, normally, the bats would already be dead when captured, thus making it difficult for them to adhere to their religious practice. Nevertheless, some young Muslim men indicated that they ate bat meat. Similarly, the SDAs indicated that they did not eat bat meat. They follow strictly the Old Testament regulations on clean and unclean animals. As indicated by Cansdale (1970b), bats are among the animals considered unclean in the Bible and which Hebrews were commanded not to consume. All other Christian denominations do not have restrictions on the consumption of bat meat, though they are considered unclean in the Old Testament.

The consumption of bat meat was influenced also by the features and characteristics of the bats. Such views were mostly expressed by female participants in the FGDs. Indeed, the findings show that men tend to consume bat meat more than women. Only a few of the women interviewed said they ate bats. A lot of participants in the female FGDs observed that bats have very strange features. They said the bats looked like dogs and human beings and believed that if a pregnant woman ate bat meat, her baby, when born, would look like a bat. One female participant in the FGDs remarked:

> If you are a pregnant woman and you like eating bats, you would give birth to a child whose face is small and who looks like a bat. The child would also not be able to cry like a normal child. When you go for postnatal visits, everybody would know you have eaten bat meat and the other women would laugh and poke fun at you. They would say your husband steals bats from the forest.

Apart from the reasons given above, other women indicated they did not like bat meat because of their pungent smell. They attributed the strong smell to the perception that bats defecate on themselves. Bats normally hang upside down on trees with their feet clutching the branch and their heads down. The odor deters some people, especially, women, from consuming them.

Others also claimed that they would experience a slow and painful death if they ate bat meat. The participants explained that bats are very strong, difficult to kill, and die slowly. Hence, the belief that anyone who ate bat meat would experience a similar death. Ironically, it is for this same reason (that they are very strong) that some men enjoy eating it. One male participant, beating his chest, described himself as very strong because he always ate bat meat. Another made a similar assertion by saying that: “if you consume bat meat every day, you will become strong; because the skin (of the bat) is very strong.”

There was no evidence that social class influenced the consumption of bats. Both people of high status and low status considered bat meat to be delicious. People of high status were more likely to consume bat meat because they could afford it. In other studies, where the sample was relatively more diverse than Tanoboase, bat meat was consumed by people of a certain class because of the “high taste ratings” and also because they could afford it (Kamins et al., 2011). Nevertheless, the hunting and consumption of bats is found to decrease with education (Lawson et al., 2016; Kamins et al., 2014).

Risk Perception of Bat-borne Disease

On whether bats harbor viruses and could transmit diseases, the participants did not believe that bats could cause diseases. This was the case for both those who consumed bat meat and those who did not. The participants were of the view that since the bats ate only fruits, their meat is very safe and healthy and does not harbor any viruses. Indeed, almost all participants in both the FGDs and the in-depth interviews indicated that they were not aware that bats harbor any viruses, nor had they experienced or witnessed someone who got sick from eating bat meat. This is what one participant said:

I have not seen or heard anyone being sick because they ate bat meat. If someone became sick after eating bat, then it means that person was already sick or about to get sick. I have not heard anything like that. No, not at all.

Discussion

In this paper, we explored the factors that shape human–bat interaction in a rural community in Ghana. The findings show that human–bat interaction in Tanoboase is influenced by gender, religious beliefs and affiliation, myths, and food taboos. There were two schools of thought about the origins of the bats at Tanoboase. The prevalent view was that the bats were brought to the sacred grove by Taakora, the highest god of the Akans who is also the deity of the community. The majority of the participants who held this view intimated that the bats have always been in the forest since their ancestors migrated to the town. The minority view held by the chief and the assemblyman was that the bats are of recent origin. There were no written records on when the bats started populating the forest. The differing views broadly indicate the deficiency inherent in oral tradition. It is possible that some aspects of the story may change through generations. That is not to say that oral history is not credible. In the absence of written records, one has no choice but to rely on oral history. We are inclined to believe that the bats were present in the community but not in large numbers; that they might have migrated to the sacred grove in large numbers when their habitats in other parts of the region or even country were destroyed by the bushfires of the 1980s. As has been noted above, Ghana experienced her worst bushfires and drought between 1983 and 1984 (Awuah-Nyamekye, 2009; Dei, 1988). Bats are known to migrate when their habitat is destroyed.

Our finding that the hunting and consumption of bats in Ghana are mediated by gender confirm those reported by Kamins et al. (2011, 2014) and Anti et al. (2015). A similar finding was made by Mickleburgh, Waylen, & Racey (2009). In a study, they conducted on the hunting and consumption of bats in several countries such as Cambodia, Malaysia, Nigeria, New Guinea, Philippines, Madagascar, Benin, and Cameroun, they found out that men tend to hunt and consume bats more than women. Mickleburgh et al. (2009) and Kamins et al. (2014) however, do not explain the gender differences that exist in the hunting and consumption of bats. On the other hand, Anti et al. (2015) indicate that women were specifically barred from hunting bats because it was a religious activity. In one of the communities they studied—Buoyem—the hunting of bats was part of the celebration of the yam festival. Also, menstruating women were barred from collecting the dead bats hunted by men because women in that state were perceived to be unclean. In our study, however, the hunting of bats was not associated with any religious ceremony. Women did not hunt bats primarily due to the hunting practices—shooting and hitting of bats with sticks. Besides, hunting occurred in the sacred grove where hunting, farming, logging, and all other activities were forbidden. The hunting practices confirm already existing gender roles in many parts of Ghana.

This paper further elucidates why women tend not to consume bat meat. The women in this study tended not to consume bat meat because of fears of having strange or deformed children, fear of dying a slow and painful death, and the strong scent emitted by bats. Observing taboos, especially those during pregnancy, is not uncommon in Ghana. Sarpong (1974, p. 86) states that: "it is believed that if a pregnant woman sees a monster or an ugly thing or person, her child will be like what she has experienced." Likewise, pregnant women are restricted from eating certain foods or drinking certain liquids for fear of affecting their babies (Sarpong, 1974; Senah, 2003). For instance, in some Ghanaian societies, pregnant women are not expected to eat snails lest the baby will drool; or eat eggs lest the child grows to become a thief (Senah, 2003). Among the Yilo Krobos of southern Ghana, a pregnant woman is forbidden to eat snails, rats, hot food, and animal lungs, although the eating of snails and rats is also forbidden outside pregnancy (Arzoaquoi, 2014). Similarly, among the Kasena Nankana of the Upper West region, pregnant women are forbidden to eat meat and groundnut, lest they give birth to spirit children (Senah, 2003). Although women in our study were not forbidden to consume bat meat, they reckoned that if they did, their children would look like the bats. Prokop, Fančovičová, & Kubiatko (2009) have observed that females normally have negative attitudes to, and tend to believe myths about, bats. In their study on students' attitudes toward bats in Slovakia, Prokop et al. (2009, p. 28) explain that women's negative attitude toward bats are "consistent with women's enhanced evolutionary role in protecting the next generation." So, women are afraid, not only for themselves, but for their offspring as well.

Currently, the hunting of bats in Tanoboase is illegal due to the fact that hunting and other economic activities are forbidden in the sacred forest. Another reason is the fact that the forest was designated by the government as an eco-tourism site (Yeboah, 2013), though this was not given as a reason for the harvesting or otherwise of bats. Officials from the Wildlife Division of the Forestry Commission visit the site periodically and interact with the traditional authorities. This might further encourage the traditional authorities to restrict the hunting of bats in the forest. There is no documentation on when the hunting of bats was legal and when it became illegal. The legalization of hunting seems to tie in with the history of the town. It seems that hunting was legal when the bats were not in the forest and became illegal when they moved into the forest. As has been alluded to, the nature of oral history makes it a bit challenging to know the exact timelines of these events.

The general view in the community was that bats could be killed for consumption but not for sale. Bats could be sold only when the bat population increases and the traditional authority allowed hunting. Otherwise, the bats are not commoditized. They are not commoditized due to the view that one should not make money off the shrine. Though the women claimed to know the price for bats, it was not sold on the open market in the town. However, bat meat was widely available at the Techiman market and at Tuobodom.

Although bats are widely consumed, they are not associated with any diseases in the community. The common diseases reported were fevers, bodily pains, and malaria. The people in the community were convinced that bat meat was safe to be consumed and healthy because bats eat only fruits. Generally, diseases in Ghana are either believed to be of natural or spiritual causes. Normally, diseases thought to be strange are believed to be spiritually caused because they cannot be explained (Abotchie, 2014). For instance, when HIV/AIDS emerged in Ghana in the early 1980s, it was thought to be spiritually caused because it was poorly understood. However, some diseases such as cancer, mental illness, and epilepsy also are given

spiritual interpretation (Atobrah, 2012). The implication of this is that should there be an outbreak of a bat-borne disease, the initial interpretation would be spiritual. This could pose a major challenge to the prevention and treatment interventions.

The implications of the hunting and consumption patterns indicate that men may be more at risk of bat-borne diseases since they tend to hunt and consume bats more than women. Typically, the transmission of bat-borne diseases occurs when one comes into contact with the saliva, feces, or blood of bats (Looi & Chua, 2007; Luby et al., 2009). For instance, the 2013 Ebola outbreak in West Africa (Baize et al., 2014) occurred when the index case came into contact with bat droppings (Saez et al., 2015). In the same vein, the nipah virus outbreak in Malaysia occurred when pig farmers came into contact with bat droppings (Looi & Chua, 2007; Luby et al., 2009). In this study, however, the men were exposed through the bites and scratches they receive from bats during hunting. In addition, they may be exposed to the blood of the bats during processing. Similar findings were reported by Anti et al., (2015) in their study of bats and human interaction in three communities in Ghana. They report that bat hunters are exposed by bat bites, scratches, and urine. Also, when not cooked properly, bat meat may pose health issues for consumers as they harbor unusually high amounts of viruses (Luis et al., 2013).

Conclusion

The hunting and consumption patterns of bats in Ghana has far-reaching consequences for the transmission of zoonotic diseases. Educational campaigns should therefore target men since they tend to be more at risk of contracting bat-borne zoonotic diseases than women. The situation is more challenging as people have a lower risk perception of disease spillover from bats. In fact, both those who consume bat meat and those who do not did not think bats could be the cause of zoonotic disease in their community. Indeed, this study was conducted before the 2013 Ebola outbreak in parts of West Africa. Further studies should be conducted to examine whether the attitudes of the people have changed since the 2013 Ebola outbreak.

This study adds to the body of knowledge on the importance of sacred forests to the conservation of the environment and wildlife. The designation of patches of forests as sacred is not uncommon in Ghana (Nganso et al., 2012; Ntiamoa-Baidu, 2008). Almost all the forest reserves in Ghana have close links with sacred groves (Nganso et al., 2012). While some of the designated sacred forests tend to be small and individually may not be significant for biodiversity conservation, they are often found in places where all the surrounding forests have been destroyed; and are therefore important for biodiversity. In the case of the Tano Sacred Grove, it is a wildlife refuge for bats and other animals. As discussed above, bushfires are common in Ghana and environmental degradation is widespread. Thus, sacred forests become useful ways of preserving the environment and protecting wildlife. The declaration of the Tano forest as an eco-tourist site deserves to be applauded and encouraged as this can improve the economy of the town, while at the same time enhancing conservation of flora and fauna for the benefit of the people.

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Conflict of interest

The authors declare there are no conflicts of interest.

Notes

1. Assemblymen are part of the local government system in Ghana. The assemblymen/women are elected by the electoral areas and who represent them at the District Assemblies. For more, see Ayee (2011).
2. A *mallam* is an Islamic spiritual healer who also consults for a wide range of conditions such as infertility, successful visa applications, and successful business deals.
3. A *gong gong* is a double cow bell (a big and small) made of brass, which is hit with a stick to make announcements in the village. The one who beats the *gong gong* is known as the gong gong beater or town crier.

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Attitudes of Dutch Citizens toward Sow Husbandry with Regard to Animals, Humans, and the Environment

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ABSTRACT The pig industry is struggling with negative attitudes of people toward sow husbandry. To be able to respond to these attitudes, the pig industry first has to understand people's attitudes. The first objective of this study was to determine the attitudes of Dutch people toward sow husbandry with regard to animals, humans, and the environment. The second objective was to group people based on their attitudes toward sow husbandry and determine and compare the socio-demographic characteristics of these groups. An online survey was conducted in the Netherlands and there were 1,607 respondents. On average, respondents had negative attitudes toward all issues defined in this study. The most negative attitudes were toward the effect on both animals and consumers of the use of antibiotics, the number of animals kept per square meter, the possibility for animals to go outside, food safety risks, public health risks, and environmental waste. The findings indicate the importance of considering all the issues identified in this study during the process of developing measures to improve people's attitudes toward sow husbandry. Respondents could be divided into four clusters; each cluster represented different attitudes toward sow husbandry and had different socio-demographic characteristics. This makes it possible for the pig industry to assign people with specific socio-demographic characteristics to one of the clusters and predict their attitudes toward sow husbandry. Knowledge of these attitudes enables the pig industry to predict how different groups of people will respond to different animal welfare measures. Results of this study are therefore useful for the pig industry to help improve people's attitudes toward sow husbandry.

Keywords: attitudes, clusters, people, sow husbandry

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In Western societies, public criticism of how animals are kept and treated in animal husbandry systems is growing (Harper & Henson, 2001; Ingenbleek, Binnekamp, van Trijp, & de Vlieger, 2004; Meuwissen & van der Lans, 2005; Norwood & Lusk, 2009; Rollin, 2004; Verbeke & Viaene, 2000). This is a result of the replacement of traditional animal husbandry with intensive systems (Rollin, 2004); this has led to fewer farms and more animals (Bock & van Huik, 2007; Fraser, 2003, Fraser, Mench, & Millman, 2001; Rollin, 2004). People became less familiar with animal production (Marchant-Forde, 2009; Meerburg, Korevaar, Haubenhofer, Blom-Zandstra, & van Keulen, 2009) as fewer people (a decrease of 50% to 1.5%) were involved (Rollin, 2004) because automation of routine tasks replaced human labor (Fraser et al., 2001). The change in animal handling within animal husbandry and people's increased awareness of animal welfare led to changing moral values (Apotheker, 2000; Bock & van Huik, 2007; Chrispeels & Mandoli, 2003; Kanis, Groen, & de Greef, 2003; Rollin, 2004) and changing attitudes toward animal husbandry (Rokeach, 1968–1969). These changes have resulted in an increase in public discussions about various aspects of animal husbandry (Fraser, 2001).

The pig industry is struggling due to negative attitudes of people toward sow husbandry (Barnett, Hemsworth, Cronin, Jongman, & Hutson, 2001; Boogaard, Bock, Oosting, Wiskerke, & van de Zijpp, 2011a; De Greef, Stafleu, & de Lauwere, 2006; Marchant-Forde, 2009; María, 2006; Schröder & McEachern, 2004). For example, people show negative attitudes toward limited space without outdoor access, lack of social contact, and lack of environmental enrichment in pig housing (Barnett et al., 2001; Boogaard, Boekhorst, Oosting, & Sørensen, 2011b; Meuwissen & van der Lans, 2005), and toward castration (Boogaard et al., 2011b; Frederiksen, Johnsen, & Skuterud, 2010; Huber-Eicher & Spring, 2008; Lagerkvist, Carisson, & Viske, 2006; Meuwissen & van der Lans, 2005). When such negative attitudes toward these issues become public, the pig industry responds with technical solutions or technical arguments (Elzen, 2011). For example, in response to negative attitudes toward limited space, the industry increased the surface area per animal. In response to negative attitudes toward outdoor access, the industry argued that outdoor access has a negative effect on animal infections and that the emissions of outdoor animals have a negative impact on the environment (Elzen, Geels, Leeuwis, & van Mierlo, 2011). Despite these solutions and arguments, attitudes remain negative (Boogaard et al., 2011b; Meuwissen & van der Lans, 2005; Verbeke & Viaene, 2000).

Technical solutions may have a positive effect on people's attitudes toward a specific issue but provoke negative attitudes toward other issues (Knight, Nunkoosing, Vrij, & Cherryman, 2003). For example, people show negative attitudes toward piglet castration without the use of anesthetics because of the effects on the animal's welfare (Frederiksen et al., 2010; Lagerkvist, Carisson, & Viske, 2006). However, if the practice of castration ceased, people's attitudes toward meat quality could become negative because of the risk of boar taint in non-castrated pig meat (Frederiksen et al., 2010; Lagerkvist et al., 2006). This shift in negative attitudes from one issue to another implies that the negative attitudes of people go beyond just one specific issue.

For the pig industry to be able to respond to the concerns of people about sow husbandry, it is important to first understand which aspects of sow husbandry play a role in shaping people's attitudes. Previous studies have shown that these attitudes are directed toward issues related to animals, humans, and the environment (Beekman, Bracke, van Gaasbeek, & van der Kroon, 2002; Blokhuis, Jones, Geers, Miele, & Veissier, 2003; Harper & Henson, 2001; Mepham, 2000). Which attitudes are most important with regard to sow husbandry may differ between groups of people based on their socio-demographic backgrounds (Boogaard,

Oosting, & Bock, 2006; Frederiksen et al., 2010; Harper & Henson, 2001; Knight, Vrij, Cherryman, & Nunkoosing, 2004; Knight & Barnett, 2008; María, 2006; Tuyttens, Vanhonacker, van Poucke, & Verbeke, 2010). Understanding which attitudes are important for different groups of people will enable the pig industry to address public concerns and predict how people will respond to animal welfare measures for sow husbandry. Previous studies have focused on issues relating to a single category, that is, animals, humans, or the environment, or a combination of two (e.g., Boogaard et al., 2011b; Frederiksen et al., 2010; Krystallis, de Barcellos, Kügler, Verbeke, & Grunert, 2009; Lagerkvist et al., 2006; Meuwissen, & van der Lans, 2005; Ngapo, Dransfielda, Martina, Magnusson, Bredahic, & Nuted, 2003; Petit & van der Werf, 2003). Therefore, the first objective of this study was to determine the attitudes of Dutch people toward sow husbandry (including breeding, gestation, farrowing, and nursery) with regard to animals, humans, and the environment. The second objective was to group people based on their attitudes toward sow husbandry and determine and compare the socio-demographic characteristics of these groups.

Methods

Before the study was set up, a literature study was conducted to find out if similar research had been done before. This was not the case. Data used for this study were collected by means of a questionnaire. By filling in the questionnaire, participants gave permission to use their answers anonymously. Our research did not have to be approved by an ethics committee.

Participants

An online questionnaire was distributed in October 2011 by a research institute that specializes in online surveys (CentERdata, connected to Tilburg University, the Netherlands) to 2,572 Dutch people. The response rate was 65.9% (1,695 out of 2,572). Only respondents who fully completed the questionnaire (n = 1,607, 62.5%) were included for further analysis. The respondents of this study were representative of the Netherlands across all socio-demographic characteristics, except for gender and age. In this study, there were more male respondents than female respondents (53.3% [n = 880] versus 47.7% [n = 727]), whereas the Dutch population contained only slightly more females (50.5%) than males (Central Bureau of Statistics, 2011). The mean age of the respondents was higher than the mean age of the Dutch population. The age categories 20–39 years, 40–64 years, and 65–80 years contained 13.8% (n = 222), 53.2% (n = 855), and 27.8% (n = 447) of the participants, respectively, whereas the corresponding percentages for the Dutch population were 31.2%, 44.8%, and 14.4% (Central Bureau of Statistics, 2011).

Materials

We developed a framework for the assessment of attitudes toward pig husbandry, based on media analysis, a literature search,[1] and expert input (Figure 1). We explored the issues related to pig husbandry that received negative attention from the following animal welfare organizations: Dutch society for the protection of animals, Stichting varkens in nood and Wakker dier. These organizations campaign about issues related to the welfare of different animal species. Many of these campaigns receive media attention and are published extensively in social media. We selected issues related to pig husbandry that were presented at least two times as a news item on the website of at least one of the animal organizations in the years 2009 to 2011. These issues were: piglet mortality, pig housing, scale increase (increase production and decrease production costs), interventions (castration, tail docking), euthanasia, sow

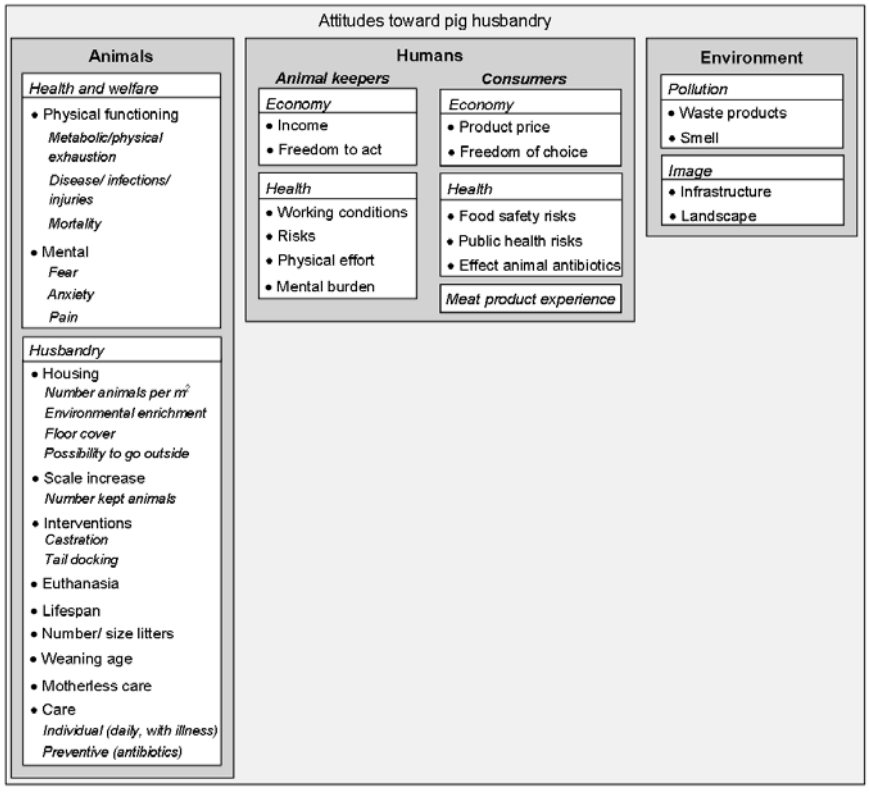

Figure 1. Framework for the assessment of attitudes toward sow husbandry. The figure shows issues (bullets) and sub-issues (italic) that play a role in citizens' attitudes toward sow husbandry with regard to animals, humans (animal keepers and consumers), and the environment. The (sub) issues are divided into different categories (white boxes).

lifespan, litter size, weaning age, motherless care, use of antibiotics, transport, and use of antibiotics. The issue "pig transport" was not selected because there is hardly any pig transport between sow farms in the Netherlands. Furthermore, the issue regarding the use of anesthetics is covered in the castration issue because discussions predominantly focused on whether or not to use anesthetics during the castration process.

Based on the selected media issues, we defined issues related to animals, humans (both animal keepers and consumers), and the environment that play a role in people's attitudes (Figure 1). We used the results of previous studies (see note at the end of the paper for references) that identified issues that are considered in attitudes toward animal husbandry. For example, people consider their attitudes toward physical animal welfare, psychological animal welfare, food safety, and the effect of the animal practice on the environment (e.g., Boogaard et al., 2011b; Mepham, 2000; Meuwissen & van der Lans, 2005; Michalopoulos, Oude Lansink, Heuvelink, & Hogeveen, 2008) before they form an opinion about animal husbandry. The issues mentioned in the literature were supplemented with issues defined by experts. Several experts were personally interviewed. Two pig farmers with a sow farm of average size were visited. Scientists in the fields of animal science, philosophy, and ethics from Wageningen University were questioned, as well as agricultural policy makers. All issues were categorized.

Questionnaire

On the basis of the framework (Figure 1), we developed a questionnaire that focused on conventional sow husbandry. In this case, conventional sow husbandry represents pig breeding practices based on the minimum legal standards in the Netherlands. The questionnaire was divided into sections on animals, humans, and the environment. Only information that was needed to understand the questions was provided. No technical information was given. For example, definitions of words such as "litter" and "sow," were given to clarify their meaning. Technical information, such as piglet mortality rate and lifespan of sows, was not given, to prevent respondents from changing their attitudes in response to the information provided.

Attitudes cannot be measured directly, but there are several indirect ways to measure them. For example, respondents could indicate whether they agree or disagree with different statements (Boogaard et al., 2011b; Krystallis et al., 2009) or could answer open questions (Meuwissen & van der Lans, 2005; Ngapo et al., 2003). Our questionnaire started with definitions of technical terms, such as sow, litter, piglet, and weaning. The first part of the questionnaire contained four questions. The first three questions related to animal, humans, and the environment, and were formulated as follows: Indicate on a scale of 10 (1 = no additional care necessary, 10 = maximal additional care necessary) how much additional care you think is necessary for the following issues, compared to the care that is currently given, when it concerns pigs/animal keepers and consumers/the environment in Dutch conventional pig husbandry. The issues that were listed in the questionnaire were identical to those in the framework (Figure 1). Additional care (AC) levels can indirectly show respondents' attitudes toward sow husbandry. People who believe that the current situation needs improvement will assign higher AC levels than people who believe the current situation is acceptable. Consequently, respondents with higher AC levels have more negative attitudes toward current sow husbandry than respondents with lower AC levels. In the fourth question, respondents could indicate whether they agreed, did not agree, or had no judgment with regard to the following statements:

- The degree of piglet mortality is acceptable.
- Weaning age is acceptable.
- The castration of piglets is acceptable.
- The docking of tails of piglets is acceptable.
- Interventions (castration/tail docking) are acceptable without sedation.
- Interventions (castration/tail docking) are acceptable with sedation.
- Housing pigs inside for their entire lifetime is acceptable.
- It is acceptable to keep sows in farrowing pens (iron fences on both sides of the sow to minimize piglet mortality) until the piglets are separated from the sow.
- The pig farmer may decide when to euthanize an animal.
- The lifespan of sows is acceptable.
- The amount of antibiotic use is acceptable for public health.

The second part of the questionnaire focused on socio-demographic characteristics: age (categories: 15–24, 25–34, 35–44, 45–54, 55–64, > 65), gender (male, female), education

Table 1. Socio-demographic characteristics of respondents to the questionnaire regarding attitudes toward sow husbandry.

Socio-demographic Characteristic	Category	*n*	Socio-demographic Characteristic	Category	*n*
Gender	Male	880	Education	Primary school	76
	Female	727		Secondary school (low)	438
Age (years)	15–24	57		Secondary school (high)	197
	25–34	74		Vocational	256
	35–44	226		BSc	430
	45–54	316		MSc	208
	55–64	428			
	65–older	506			

(primary school, secondary school (low), secondary school (high), vocational, BSc, MSc), (see Table 1 for results), religious (yes, no, a little), pets (yes or no), size of residence (inhabitants: < 500, 500–999, 1,000–1,499, 1,500–2,499, > 2,499), province of residence (Friesland, Groningen, Noord-Holland, Zuid-Holland, Drenthe, Overijsel, Flevoland, Gelderland, Utrecht, Zeeland, Noord-Brabant, Limburg), childhood residence (Randstad [most urban area in the Netherlands], big city, small city, big village, small village) and meat consumption habits (often eating pig meat, sometimes eating pig meat, eating other meat than pig meat, eating organic meat, vegetarian), getting information about pig husbandry (i.e., absorb information to increase knowledge; yes, no), visited a pig farm (yes, no).

Data Analysis

Before the statistical analyses were performed, the AC levels were decreased from a 10-point Likert scale to a 5-point Likert scale (1: no AC necessary, 2: little AC necessary, 3: moderate AC necessary, 4: much AC necessary and 5: utmost AC necessary. Levels 1 and 2 became level 1, levels 3 and 4 became level 2, etc.).

Descriptive statistical analyses were carried out to identify the AC levels of Dutch people toward sow husbandry issues. Based on the AC levels given by the respondents, a cluster analysis (using Ward's method) was performed to group respondents. The probability that respondents in a certain cluster gave higher or lower AC levels than respondents in the other clusters ($p < 0.05$) was calculated using ordered multinomial logistic regression. Binary logistic regression was performed to analyze whether respondents in each cluster could be identified by specific socio-demographic characteristics ($p < 0.05$). To account for the possible non-representativeness of gender and age, these calculations were based on one cluster containing 100% of respondents for each socio-demographic characteristic, instead of all clusters together containing 100% of respondents. The percentage of respondents in each category of socio-demographic characteristic for one cluster was compared with the percentage of respondents in the other clusters.

Multinomial logistic regression was performed to analyze the impact of cluster membership on a combination of socio-demographic characteristics ($p < 0.05$). For this analysis, a base respondent was used to be able to make the comparisons. This base respondent had the following socio-demographic characteristics: male, between 15 and 24 years old,

Table 2. Additional care (AC) levels assigned by respondents to issues in sow husbandry. The AC levels indicate the level of extra attention respondents found necessary considering the current situation in sow husbandry. AC levels: no AC necessary (NAC), little AC necessary (LAC), moderate AC necessary (MAC), strong AC necessary (SAC), and utmost AC necessary (UAC). For each issue, the percentage of respondents per AC level is presented as well as the mean AC level on a 5-point scale.

		Additional Care (%)					
Entity	**Issue**	**NAC**	**LAC**	**MAC**	**SAC**	**UAC**	**Mean AC level**
Animals	Metabolic/ physical exhaustion	8.8	9.5	32.7	33.7	15.3	3.4
	Disease/infection/injuries	3.7	5.6	25.2	39.6	25.9	3.8
	Mortality	4.5	5.8	33.5	36.5	19.7	3.6
	Fear/anxiety	2.4	4.9	27.7	36.3	28.7	3.8
	Pain	2.4	5.1	26.1	35.5	30.9	3.9
	Number of animals per m^2	2.8	3.8	26.1	34.0	33.3	3.9
	Environmental enrichment	5.9	7.1	32.5	32.9	21.6	3.6
	Floor cover	3.1	4.8	27.1	36.6	28.4	3.8
	Possibility of going outside	3.3	4.4	22.7	30.2	39.4	4.0
	Number of kept animals	3.5	4.8	26.5	33.7	31.5	3.8
	Castration	5.8	7.4	32.4	26.5	27.9	3.6
	Tail docking	5.9	7.9	30.4	27.4	28.4	3.6
	Time euthanasia	5.7	6.7	33.6	29.1	25.0	3.6
	Lifespan sow	4.2	5.4	34.4	32.1	23.9	3.7
	Number of litters per sow	4.9	5.1	34.9	31.2	23.9	3.6
	Litter size	5.7	6.3	36.6	30.6	20.8	3.5
	Weaning age	4.8	6.6	35.2	31.5	21.9	3.6
	Motherless care	4.6	6.9	29.5	31.7	27.3	3.7
	Care for individual animal	4.1	5.1	28.6	33.1	29.1	3.8
	Use of antibiotics (animal)	3.0	2.6	21.1	22.8	50.5	4.2
Humans (animal keepers)	Enough income	3.9	6.0	33.6	41.4	15.2	3.6
	Freedom to act	5.9	10.2	42.7	31.1	10.1	3.3
	Working conditions	4.2	7.6	36.3	37.4	14.6	3.5
	Health risks	3.4	4.7	28.9	36.6	26.4	3.8
	Physical burden	4.3	7.1	35.0	37.5	16.2	3.5
	Mental burden	4.4	7.2	35.0	37.0	16.6	3.5
Humans (consumers)	Product price	7.9	10.8	35.8	31.6	13.9	3.3
	Freedom of choice	7.4	10.4	34.2	33.5	14.4	3.4
	Food safety risks	3.0	4.6	23.3	30.8	38.3	4.0
	Public health risks	2.8	3.6	22.3	29.2	42.1	4.0
	Use of antibiotics (human)	2.7	3.2	19.8	23.8	50.5	4.2
	Meat product experience	8.0	7.3	36.9	29.8	18.0	3.4
Environment	Environmental waste	2.4	3.6	20.3	37.3	36.4	4.0
	Smell	5.1	8.7	32.3	31.5	22.4	3.6
	Change in infrastructure	3.5	6.1	31.0	36.9	22.5	3.7
	Image landscape	2.4	11.7	32.3	32.3	21.3	3.6

primary school as highest education, religious, has pets, has visited a pig farm, gets information about pig husbandry, often eats pig meat, lives in an extremely urban city in the north of the Netherlands, and has grown up in the most urban area in the Netherlands (referred to as the Randstad).

Results

In general, respondents were of the opinion that additional care (AC) was necessary for all issues in the framework. Mean AC levels were above 3.2 on the 5-point scale for all issues (Table 2). More than 50% of the respondents indicated that much or utmost AC was necessary for most issues, except for metabolic/physical exhaustion, freedom to act, product price, freedom of choice, and meat product experience. Most respondents (≈ 70%) indicated much or utmost AC was necessary for the following issues: possibility for animals to go outside, the use of antibiotics with regard to animals and consumers, food safety risks, public health risks, and environmental waste (Table 2). For all these issues, the mean AC level was 4.0 or higher.

Clusters of Respondents

The cluster analysis assessed whether different respondents could be clustered according to the AC levels they assigned to the issues. Four clusters were formed: the no-AC cluster (7.1% respondents), moderate-AC (38.8% respondents), high-AC (40.1% respondents), and max-AC cluster (14.0% respondents). The mean AC levels for each cluster of respondents and for each category of issues are presented in Figure 2.

Results of the ordered multinomial logistic regression show that the probability that respondents from the different clusters gave different AC levels was significant ($p < 0.04$) for all issues. This means that respondents in the max-AC cluster gave significantly higher AC levels for all issues than respondents in the other three clusters, respondents in the no-AC cluster gave significantly lower AC levels than respondents in the other three clusters, and respondents in the high-AC cluster gave higher AC levels than respondents in the moderate-AC cluster.

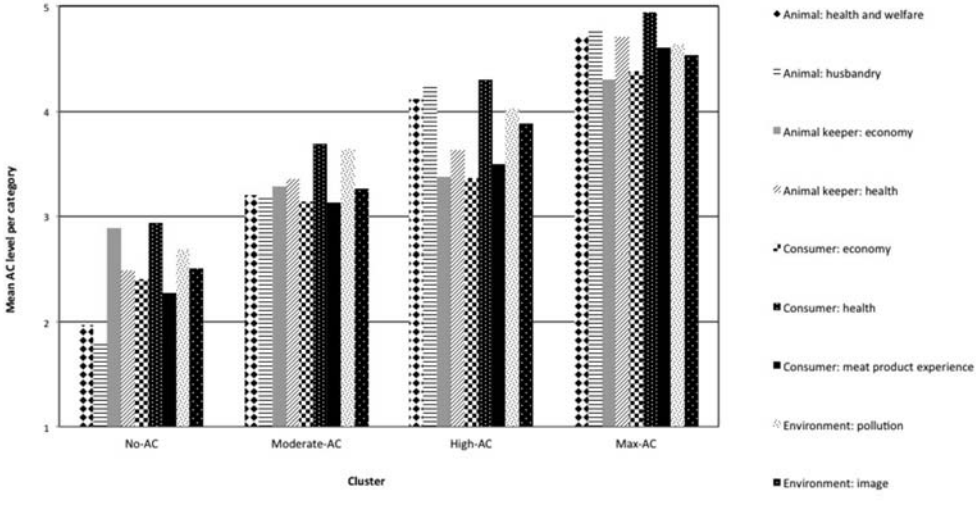

Figure 2. Mean additional care (AC) level, that is, the level of additional care that was found necessary considering the current situation, given by each cluster of respondents for each category of issues with regard to sow husbandry. Respondents were clustered according to their AC levels. AC levels: 1: no AC necessary, 2: little AC necessary, 3: moderate AC necessary, 4: strong AC necessary, and 5: utmost AC necessary. Percentage of respondents in each cluster: no-AC cluster: 7.1% (n = 114), moderate-AC cluster: 38.8% (n = 623), high-AC cluster: 40.1% (n = 645), and max-AC cluster: 14.0% (n = 225).

Table 3. Mean additional care (AC) levels assigned by clusters of respondents to issues in sow husbandry. The AC levels indicate the level of extra attention respondents found necessary considering the current situation in sow husbandry. Respondents were clustered according to their AC levels. AC levels: 1: no AC necessary, 2: little AC necessary, 3: moderate AC necessary, 4: strong AC necessary, and 5: utmost AC necessary. Percentage of respondents in each cluster: high-AC cluster: 40.1% (n = 645), moderate-AC cluster: 38.8% (n = 623), max-AC cluster: 14.0% (n = 225), and no-AC cluster: 7.1% (n = 114).

		Mean AC level			
Entity	**Issue**	**High-AC**	**Moderate-AC**	**Max-AC**	**No-AC**
Animals	Quality/quantity feed	3.66	2.96	4.53	1.71
	Rate sickness/infection/injury	4.17	3.33	4.77	2.13
	Mortality	4.05	3.11	4.62	1.87
	Fear/anxiety	4.34	3.29	4.80	2.09
	Pain	4.38	3.34	4.84	2.04
	Number of kept animals	4.35	3.38	4.72	1.88
	Environmental enrichment	4.02	3.09	4.54	1.76
	Number of animals per m^2	4.43	3.40	4.81	2.04
	Floor cover	4.28	3.33	4.83	1.98
	Possibility of going outside	4.51	3.47	4.83	2.06
	Tail docking	4.18	3.09	4.67	1.67
	Castration	4.17	3.04	4.71	1.71
	Time euthanasia	4.13	3.06	4.72	1.50
	Lifespan sow	4.15	3.12	4.80	1.64
	Number of litters per sow	4.12	3.09	4.76	1.65
	Litter size	4.03	2.98	4.69	1.61
	Weaning age	4.10	3.02	4.73	1.61
	Motherless care	4.25	3.11	4.84	1.57
	Care for individual animal	4.32	3.22	4.87	1.62
	Use of antibiotics (animal)	4.54	3.70	4.87	2.96
Humans (animal keepers)	Enough income	3.53	3.40	4.48	3.06
	Freedom to act	3.22	3.16	4.13	2.72
	Working conditions	3.50	3.30	4.61	2.48
	Health risks	3.89	3.48	4.88	2.61
	Physical burden	3.57	3.31	4.67	2.41
	Mental burden	3.54	3.33	4.67	2.46
Humans (consumers)	Product price	3.31	3.16	4.36	2.34
	Freedom of choice	3.41	3.13	4.40	2.48
	Food safety risks	4.19	3.61	4.92	2.73
	Public health risks	4.29	3.68	4.96	2.83
	Use of antibiotics (human)	4.42	3.77	4.96	3.24
	Meat product experience	3.50	3.13	4.61	2.28
Environment	Environmental waste	4.29	3.66	4.78	2.90
	Smell	3.76	3.62	4.49	2.47
	Change in infrastructure	3.95	3.32	4.59	2.46
	Image landscape	3.82	3.21	4.49	2.55

For issues related to the animal, respondents in the max-AC cluster gave AC levels between 4.5 and 5.0, respondents in the high-AC cluster gave AC levels between 3.6 and 4.6, respondents in the moderate-AC cluster gave AC levels between 2.9 and 3.4, and respondents in the no-AC cluster gave AC levels between 1.5 and 2.1, except for the issue “use of antibiotics” (mean AC level for the no-AC cluster was 3.0).

For issues related to the animal keeper, respondents in the max-AC cluster gave AC levels between 4.1 and 4.9, respondents in the high-AC cluster gave AC levels between 3.2 and 3.6, respondents in the moderate-AC cluster gave AC levels between 3.1 and 3.5, and respondents in the no-AC cluster gave AC levels between 2.3 and 2.8, except for the issue "enough income" (mean AC level for the no-AC cluster was 3.1).

For issues related to the consumer, respondents in the max-AC cluster gave AC levels between 4.3 and 5, respondents in the high-AC cluster gave AC levels between 3.3 and 4.5, respondents in the moderate-AC cluster gave AC levels between 3.1 and 3.8, and respondents in the no-AC cluster gave AC levels between 2.3 and 2.9, except for the issue "use of antibiotics" (average AC level for the no-AC cluster was 3.2).

For issues related to the environment, respondents in the max-AC cluster gave AC levels between 4.4 and 4.8, respondents in the high-AC cluster gave AC levels between 3.8 and 4.3, respondents in the moderate-AC cluster gave AC levels between 3.2 and 3.7, and respondents in the no-AC cluster gave AC levels between 2.4 and 2.9. The mean AC levels given by each cluster for each issue are presented in Table 3.

Socio-demographic Characteristics

The four clusters of respondents differed in most socio-demographic characteristics (Table 4). For the characteristic "has pets," there were no significant differences between clusters. For the characteristics "province of residence" and "size of residence" there were a few significant differences between clusters but the numerical differences were not divergent. These socio-demographic characteristics were therefore excluded from the table. In all clusters, more than 70% of the respondents sought information about pig husbandry.

Respondents in the moderate-AC cluster had a higher probability than respondents in the other three clusters to have grown up in the Randstad (the most urban part of the Netherlands; $p < 0.02$) or in a big village ($p < 0.01$). Respondents in the moderate-AC cluster had a higher probability to be male ($p < 0.01$) than respondents in the high-AC and max-AC clusters, and a higher probability to be aged 15 to 24 years ($p < 0.01$) than respondents in the high-AC cluster. Finally, respondents in the moderate-AC cluster had a higher probability than respondents in the max-AC cluster to be aged ($p < 0.05$) 25 to 34 years, 35 to 44 years, or 45 to 54 years, to have a master's degree ($p < 0.05$), and/or not be religious ($p < 0.03$).

Respondents in the high-AC cluster had a higher probability to be female ($p < 0.01$) and to eat organic meat ($p < 0.03$) than respondents in the moderate-AC and no-AC clusters. Respondents in the high-AC cluster had a higher probability than respondents in the no-AC cluster to be 65 years or older ($p < 0.04$) and to have grown up in the Randstad ($p < 0.02$). Compared with respondents in the max-AC cluster, respondents in the high-AC cluster had a higher probability to be aged 45 to 54 years ($p < 0.01$), to have a master's degree ($p < 0.05$), and not be religious ($p < 0.03$). Finally, respondents in the high-AC cluster had a higher probability than respondents in the moderate-AC cluster to be vegetarian ($p > 0.01$) and to obtain information about pig husbandry ($p < 0.03$).

Compared with the other three clusters, respondents in the max-AC cluster had a higher probability to be aged 55 to 64 years ($p < 0.05$), to have lower secondary school as the highest level of education ($p < 0.01$), to be a little religious ($p < 0.05$), to have grown up in a big city ($p < 0.03$) or the Randstad ($p < 0.02$), and to eat meat other than pig meat ($p < 0.04$). Respondents in the max-AC cluster had a higher probability to be female ($p < 0.01$), aged 65 years or older ($p < 0.02$), and eat organic meat ($p < 0.03$) than respondents in the moderate-AC

Table 4. Significant differences between clusters of respondents per category of socio-demographic characteristic. The clusters were formed based on additional care (AC) levels, that is, level of extra attention found necessary considering the current situation, assigned by respondents to issues in sow husbandry. Percentage respondents: no-AC cluster: 7.1% (n = 114), moderate-AC cluster: 38.8% (n = 623), high-AC cluster: 40.1% (n = 645), and max-AC cluster: 14.0% (n = 225).

			Cluster (%)			
Socio-demographic Characteristic	**Category**	***n***	**No- AC**	**Moderate-AC**	**High-AC**	**Max-AC**
Gender	Male	880	64.0[b]	59.7[b]	50.5[a]	48.4[a]
	Female	727	36.0[b]	40.3[b]	49.5[a]	51.6[a]
Age (years)	15–24	57	4.4	5.3[b]	1.9[a]	3.1
	25–34	74	7.0[a]	5.1[a]	4.7	1.8[b]
	35–44	226	14.9	16.5[a]	13.3	8.9[b]
	45–54	316	25.4[a]	20.1[a]	21.1[a]	11.6[b]
	55–64	428	25.4[a]	23.4[a]	26.5[a]	36.4[b]
	65–older	506	22.8[a,d]	29.3[a]	32.6[c]	38.2[b]
Education	Primary school	76	4.4	5.0	4.2	5.8
	Secondary school (low)	438	22.1[a]	24.8[a]	26.0[a]	40.4[b]
	Secondary school (high)	197	15.0	12.7	12.7	8.4
	Vocational	256	15.0	15.9	16.1	16.0
	BSc	430	28.3	26.8	27.8	23.1
	MSc	208	15.0	14.8[a]	13.2[a]	6.2[b]
Religious	Yes	451	32.5	28.3	26.7	29.3
	No	814	55.3[a]	51.7[a]	51.8[a]	42.2[b]
	A little*	342	12.3[a,d]	20.1[a,c]	21.6[a,c]	28.4[b]
Childhood Residence	Randstad**	411	11.4[d]	23.1[b,c]	30.1[a,c]	26.7[c]
	Big city	210	10.5[a]	13.0[a]	11.0[a]	20.4[b]
	Small city	271	13.2	16.7	18.1	15.6
	Big village	264	19.3	19.1[b]	15.0[a]	11.6[a]
	Small village	451	45.6[b]	28.1[a]	25.7[a]	25.8[a]
Eating Meat	Often pig meat	606	54.4[a,d]	44.3[b]	31.6[a,c]	28.4[a,c]
	Sometimes pig meat	701	34.2	43.3	44.8	45.8
	Other meat (no pig meat)	155	4.4[b]	8.5[c]	10.2[a]	13.8[a,d]
	Organic meat	94	1.8[b]	2.9[b]	8.2[a]	9.3[a]
	Vegetarian	51	5.3[a]	1.0[b]	5.1[a]	2.7
Ever Visited a Pig Farm	Yes	727	63.2[b]	46.5[a]	42.8[a]	39.6[a]
	No	880	36.8[b]	53.5[a]	57.2[a]	60.4[a]
Get Information about Pig Husbandry	Yes	1,265	78.9	71.9[b]	85.0[a]	79.6[a]
	No	342	21.1	28.1[b]	15.0[a]	20.4[a]

Percentages are calculated assuming that one cluster includes 100% of respondents for each socio-demographic characteristic.

*Believing there is "something" (Drees, 1999).

**Randstad is the most urban area in the Netherlands.

[a,b]Per category of the socio-demographic characteristic, respondents had a significantly ($p < 0.05$) higher/lower probability to be in the cluster with "a" than in the cluster with "b."

[c,d]Per category of the socio-demographic characteristic, respondents had a significantly ($p < 0.05$) higher/lower probability to be in the cluster with "c" than in the cluster with "d."

and no-AC clusters. Finally, respondents in the max-AC cluster had a higher probability than respondents in the moderate-AC cluster to obtain information about pig husbandry ($p < 0.03$).

Compared with the other three clusters, respondents in the no-AC cluster had higher probabilities to often eat pig meat ($p < 0.05$), to be raised in a small village ($p < 0.01$), and to have visited a pig farm at least once ($p < 0.01$). More than half of the respondents (63.2%) in the no-AC cluster had visited a pig farm at least once, compared with less than half (< 46.6%) of the respondents in the other three clusters. Respondents in the no-AC cluster had a higher probability than respondents in the max-AC cluster to be aged 25 to 34 years or 45 to 54 years ($p < 0.03$), and to not be religious ($p < 0.03$). Finally, respondents in the no-AC cluster had a higher probability ($p < 0.01$) to be vegetarian than respondents in the moderate-AC cluster.

Significant ($p < 0.05$) effects between clusters were also found in combinations of socio-demographic characteristics. When a respondent had the socio-demographic features of male, between 15 and 24 years old, primary school as highest level of education, religious, has pets, has visited a pig farm, obtains information about pig husbandry, often eats pig meat, lives in an extremely urban city in the north of the Netherlands, and has grown up in the Randstad (basic respondent), he had a relatively higher probability to be in the moderate-AC cluster than in the high-AC cluster and the max-AC cluster, and also a higher probability to be in the no-AC cluster than in the moderate-AC cluster.

Compared with respondents in the high-AC cluster, respondents in the moderate-AC cluster had a higher probability to be male, aged between 25 and 34 years, had grown up in a big city, did not eat pig meat or other meat, was not vegetarian, and did not obtain information about pig husbandry, compared with respondents in the high-AC cluster. Vocationally educated respondents who had grown up in a big city and ate meat other than pig meat had a higher probability to be in the max-AC cluster than in the high-AC cluster. Respondents who were not very religious, who ate meat other than pig meat, ate organic meat, and sometimes ate pig meat, who did not grow up in a small or big village, and who has not visited a pig farm had a higher probability to be in the max-AC cluster than in the no-AC cluster. Compared with respondents in the moderate-AC cluster, respondents in the max-AC cluster had a higher probability to be female, aged between 55 and 64 years, vocationally educated, eat organic meat, eat meat other than pig meat, sometimes eat pig meat, or were vegetarian, have obtained information about the pig husbandry, have not grown up in a village, and not have a master's degree. Respondents who had grown up in a small or big village, had visited a pig farm, did not eat meat other than pig meat, sometimes ate pig meat, and ate organic meat had a higher probability to be in the no-AC cluster than in the high-AC cluster. Vegetarian respondents who had grown up in a small village, who had visited a pig farm, and who were not in the 25 to 34 years age group had a higher probability to be in the no-AC cluster than in the moderate-AC cluster.

Discussion

A cross-sectional study was used to obtain insight into the attitudes of Dutch people toward sow husbandry. The difference in gender between respondents and the Dutch population was minimal and was therefore assumed to have not affected the results. The higher age of respondents compared with those of the Dutch population may have affected the results, as previous studies show that older people have more negative attitudes toward animal husbandry (Frederiksen et al., 2010; Knight et al., 2004) or less (María, 2006; Vanhonacker, van Poucke, Tuyttens, & Verbeke, 2010a). In our study, older respondents had more

negative attitudes toward sow husbandry than younger respondents. To make our results useful for the Dutch population, the analyses grouped respondents based on socio-demographic characteristics.

Our results suggest that, on average, people's attitudes toward all the defined issues related to animals, humans, and the environment were negative, based on AC levels above 3.0 (moderate) indicating negative attitudes. This means that all these issues are important in people's attitudes toward sow husbandry. In order to predict the effect of implementing animal welfare measures in sow husbandry on people's attitudes, the pig industry should evaluate the impact of these measures on all defined issues. Some of the issues may be of higher importance than others because people have stronger negative attitudes toward some of them.

The AC levels presented in this paper can be used to indicate the importance of issues. Based on AC levels, the most important issues are: the use of antibiotics in relation to animals and humans, the number of animals per square meter, the possibility for animals to go outside, food safety risks, public health risks, and environmental waste. Previous studies also indicate that confined animal housing (Boogaard, Bock, Oosting, & Krogh, 2010; Meuwissen & van der Lans, 2005), the effects on human health (Driessen, 2012; Frederiksen et al., 2010; Huber-Eicher & Spring, 2008; Ngapo et al., 2003), and environmental waste (Driessen, 2012; Kanis et al., 2002; McGlone, 2001; Ngapo et al., 2003) are important issues in people's attitudes toward sow husbandry. The negative attitudes toward the use of antibiotics may partly be explained by negative publicity before and during the period in which the questionnaire was presented (Wakker dier, 2011). However, negative attitudes toward the use of antibiotics will probably always exist because of the fear of residuals in meat and the effect on human health (Frederiksen et al., 2010; Huber-Eicher & Spring, 2008; Ngapo et al., 2003).

Clusters of people were distinctive in their attitudes toward sow husbandry and socio-demographic characteristics. The socio-demographic characteristics that were particularly distinctive between clusters were gender, age, education, religion, childhood residence, vegetarianism, and experience on a pig farm. Our findings correspond to the results of previous studies: females have more negative attitudes toward animal husbandry practices, such as sow husbandry, than males (Frederiksen et al., 2010; Harper & Henson, 2001; Herzog, 2007; Knight et al., 2004; María, 2006; Prickett, Bailey Norwood, & Lusk, 2010; Tuyttens et al., 2010; Vanhonacker et al., 2010 a); people who eat meat support the use of animals more than people who do not eat meat (Knight et al., 2004), people with farm experience are more positive about animal welfare than people without farm experience (Boogaard et al., 2006), and lower educated people consider animal welfare more than higher educated people when purchasing meat (Prickett et al., 2010). Regarding age, studies show different results (Frederiksen et al., 2010; Knight et al., 2004; María, 2006; Vanhonacker et al., 2010a). This difference may be the result of a different focus. When the focus was on animal husbandry independent of the type of animal, older respondents showed less negative attitudes (María, 2006, Vanhonacker et al., 2010a). In contrast, when the focus was on the husbandry system of a specific type of animal, older people showed more negative attitudes (María, 2006; Vanhonacker et al., 2010a). The latter finding corresponds to our focus and findings.

The four different clusters presented in this paper show that different groups of people have different attitudes toward sow husbandry. Because of these different attitudes, the effect of measures for sow husbandry on these attitudes will also differ between clusters. Based on socio-demographic background, it is possible to assign a person to one of the clusters. For example, respondents in our study who were female, older than 55 years of age, a little

religious, or had a lower education level had a higher probability to be in the max-AC cluster than in the other clusters. A person with some or all of these socio-demographic characteristics most likely has strongly negative attitudes toward sow husbandry. Our study also shows that a combination of several socio-demographic characteristics gives a higher probability to be in a specific cluster. This indicates that there is an interaction between socio-demographic characteristics. Kandall, Labao, and Sharp (2006) mention the possibility of an interaction between education level, gender, and age, which means that education levels alone are not indicative of the level of intelligence in males and females of a certain age. The difference in education level between males and females may be because females were generally unable to get higher education prior to the 1950s. This means that females above 55 years old have a lower education than males of the same age. Consequently, people in the cluster with the most females (high-AC) tend to be older and lower educated as well, as shown in our results. How many of the socio-demographic characteristics should be met in order to assign a person to a cluster should be further studied. When groups of people with specific socio-demographic backgrounds can be assigned to one of the clusters, it is possible to predict the effect of measures for sow husbandry on the attitudes of these groups toward them. Based on this information, the pig industry can decide which groups of people they want to focus on or which groups they want to exclude. For example, it might be interesting to focus on groups of people that start public discussions about animal husbandry. However, first the socio-demographic characteristics of these groups have to be known.

In the questionnaire used in this study, only strictly necessary information was provided. Providing information in a questionnaire can influence respondents' answers (Manfreda, Batageij, & Vehovar, 2002). As most Dutch people have little knowledge of pig husbandry (Boogaard et al., 2011b) but still have an opinion (Kanis et al., 2003), we were interested in people's current attitudes toward sow husbandry, without providing them additional information. A disadvantage of this approach is that the attitudes studied may be informed by false knowledge. Providing people with information and, thus, knowledge about pig husbandry may positively or negatively change their attitudes toward pig husbandry (Boogaard et al., 2011b). This suggests that the industry should be careful in its communications with people about changes within sow husbandry. Communication should focus on the feelings they have about sow husbandry rather than providing only technical information, which people are not interested in (Backus & van der Schans, 2000). Sharing feelings when providing information about implemented measures can lead to a better understanding by people of the effects of the system on both animals and humans (Knight & Barnett, 2008). A better understanding may influence people's attitudes toward sow husbandry.

The pig industry should respond to people's attitudes toward sow husbandry in order to improve these attitudes. The industry can respond by adjusting the animal welfare measures in a way that is acceptable for people and/or by changing their communication in a way that is understandable for people. What can be adjusted in animal welfare measures and how communication could be changed should be further studied.

In conclusion, the present study has shown that the issues presented in our framework are all important in people's attitudes toward sow husbandry. This makes the framework a useful tool in the evaluation of these attitudes. Our results provide the pig industry with knowledge about people's attitudes toward sow husbandry, which can be used to develop measures to address them. People can be divided into four different clusters based on their attitudes toward sow husbandry. These clusters differ in socio-demographic characteristics. The pig industry

can use the clusters to select groups of people which they can focus on to improve people's attitudes toward sow husbandry. In this process, it is important for the pig industry to also consider communication style, to avoid negatively influencing these attitudes.

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Conflicts of Interest

The authors state there are no conflicts of interest.

Note

1. Literature used for the development of the framework: (Barnett et al., 2001; Beekman et al., 2002; Boogaard et al., 2011a; Boogaard et al., 2011b; Cohen, 2010; Cohen, Brom, & Stassen, 2012; Driessen, 2012; Fraser, 1999; Frederiksen et al., 2010; Harper & Henson, 2001; Huber-Eicher & Spring, 2008; Kanis et al., 2003; Krystallis et al., 2009; Lagerkvist et al., 2006; Marchant-Forde, 2009; McGlone, 2001; Mepham, 2000; Meuwissen & van der Lans, 2005; Michalopoulos et al., 2008; Millman, 2011; Ngapo et al., 2003; Petit & van der Werf, 2003; Te Velde, Aarts, & van Woerkum, 2002; Tuyttens et al., 2010; Vanhonacker et al., 2008; Vanhonacker et al., 2010a; Vanhonacker et al., 2010b; Verbeke & Viaene, 1999; Verdoes & Swinkels, 2003; Von Essen & McCurdy, 1998; Webster, 2001).

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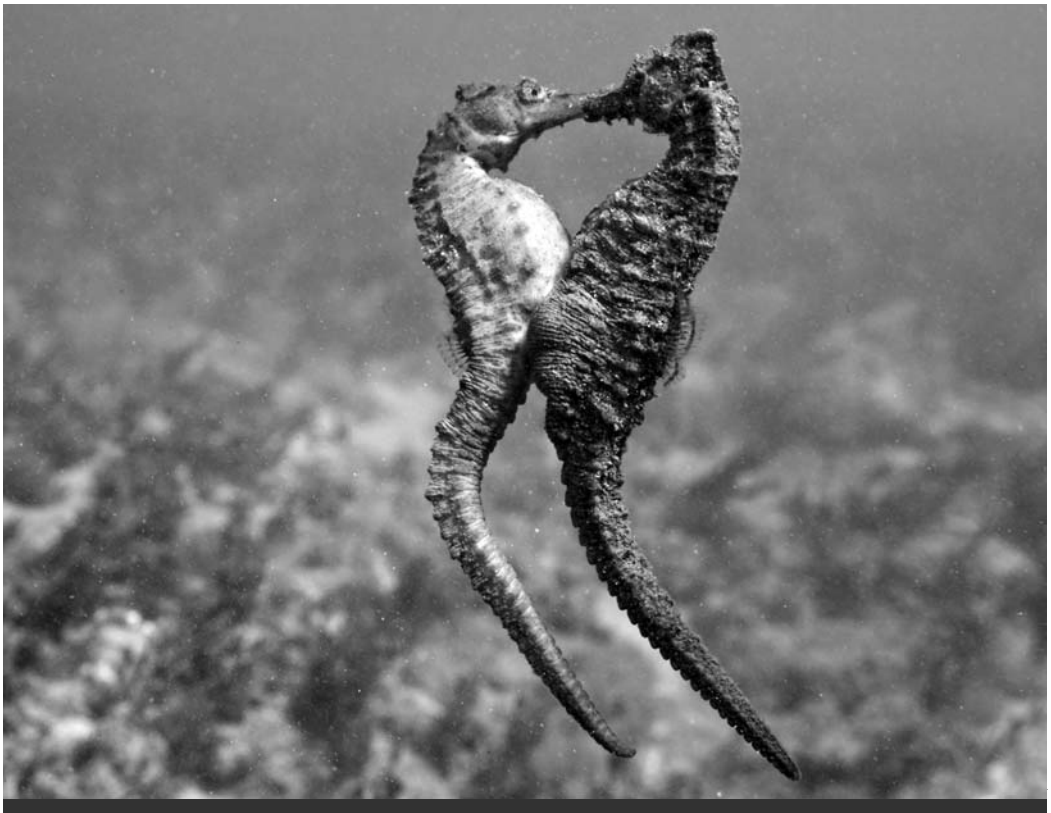

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Happy Chickens Lay Tastier Eggs: Motivations for Buying Free-range Eggs in Australia

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ABSTRACT Recent public interest in so-called "ethical" food production, and in particular the welfare of intensively housed farm animals, has been linked to an increase in sales of free-range eggs in several countries including Australia. Animal activist groups around the world have campaigned for the abolition of caged-egg production, retailers and large food companies are now sourcing less of these products, and governments in various locales have placed restrictions on caged-egg production. In addition, the recent focus on food production and preparation in popular culture including books, films, and television has made these practices, including those associated with eggs, more transparent to mainstream audiences. Previous studies have examined consumers' willingness-to-pay for free-range eggs, and community attitudes to animal welfare, but there has been little qualitative work that unpacks a key assumption which underlies much discussion of these issues: that free-range egg purchases are primarily or solely linked to consumers' desires to have egg production systems changed from intensive to free-range. This paper analyses qualitative research undertaken in Australia that explores consumers' motivations for buying free-range (or cage-free) eggs, which was part of a larger study examining ethical foods. Qualitative analysis of focus groups and interviews involving 73 participants revealed that free-range and cage-free eggs are perceived as being better quality, more nutritious, and safer, and having better sensory characteristics, than caged eggs. In response to open-ended questions, free-range and cage-free eggs were mentioned much more frequently than free-range meats, and were described as easy to identify and affordable, compared with other products with humane production claims. Several participants even had begun keeping their own hens in order to have an alternative to purchasing caged (or expensive free-range) eggs. Although caged-egg production was described by many participants as cruel, the desire to purchase free-range eggs was more often described in connection to efforts to avoid "industrialized" food than in relation to taking a stance on the issue of caged-hen welfare.

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Keywords: animal welfare, consumer attitudes, egg production, ethical consumption, free-range

There has been increasing interest in consumer perceptions of the welfare of food and fiber production animals in recent years in Europe (e.g., Boogaard, Oosting, Bock, & Wiskerke, 2011; Vanhonacker et al., 2012), the USA (Prickett, Norwood, & Lusk, 2010), and Australia (e.g., Coleman, Rohlf, Toukhsati, & Blache, 2015; Taylor & Signal, 2009). The publication of *Animal Machines* by Ruth Harrison in 1964 in response to the intensification of farm animal production in Europe highlighted the treatment of farm animals to a largely urban public disconnected from food production, leading to interventions by government to regulate how farm animals were treated (Woods, 2011). Recently celebrity chefs such as Jamie Oliver, popular books including Michael Pollan's *The Omnivore's Dilemma* (2006), and films such as *Food, Inc.* (2008) have stimulated public interest in "ethical" food production and consumption, including attention to avoidance of food produced from intensively farmed animals. Retailers also have had major roles in bringing awareness of the consumption of products with ethical claims more into the mainstream (Hartleib & Jones, 2009), and have "reconceptualise[d] values by promoting particular standards or principles of judgement to apply to food decision-making" (Dixon, 2003, p. 37).

Ethicvolual food consumerism (Ankeny, 2012) describes a set of voluntary food choices directed toward a "moral other" because of values and beliefs, and may involve avoiding foods that can be morally problematic, or choosing certain foods over others because of a percieved ethical superiority. For example, consumers who purchase free-range eggs because they believe it is wrong to keep hens in cages are participating in an act of ethical consumerism. Ethical consumerism can be thought of as a conscious or political act, for example, consumers "voting with their dollar" (Shaw, Newholm, & Dickinson, 2006, Willis & Schor, 2012) or "voting with their forks" (Parker, 2013); an example would be purchasing free-range eggs with the ultimate aim of eliminating caged egg production through market forces. However, the idea that people can simultaneously act as citizens and consumers has been challenged by some scholars, such as Johnston (2008) and Guthman and Brown (2016), who found that in circumstances where people are encouraged to act as citizens, such as shopping at a Whole Foods Market (Johnston, 2008) or posting comments opposing the use of an agricultural chemical (Guthman & Brown, 2016), consumerism becomes dominant (see also Ankeny, 2016 for the contrast between food citizens and consumers). A more extreme critique using a critical animal studies approach (Jenkins & Twine, 2014) contends that the concept of "food autonomy" is flawed and that consumers are not as "free" as we might think when making food choices, given dominant sociocultural norms particularly about animal consumption. Although they do not explicitly address political consumerism with regard to food, they note that food choices, for instance whether to be vegan or consume animal products, are moral rather than lifestyle decisions.

Scholarly work on public perceptions of farm animal welfare has tended to focus on what people kno<w about how animals are treated on farms (Coleman, 2010), what people think about farm animal welfare (Boogaard, Oosting, & Bock, 2006; Boogaard et al., 2011; Prickett, Norwood, & Lusk, 2010; Vanhonacker, Van Poucke, Tuyttens, & Verbeke, 2010; Vanhonacker et al. 2012; Coleman, Jongman, Greenfield, & Hemsworth, 2016), or whether consumers are willing to pay premiums for products with ethical claims (Taylor & Signal, 2009; Chang, Lusk, & Norwood, 2010; Elbakidze & Nayga, 2012). However, we have been unable to find any attempt to unpack why people may be motivated to purchase products with animal welfare

claims and to test the assumption that such decisions are acts of ethical consumerism or directly related to concerns about animal welfare, which is what this paper explores.

Farm animal welfare has received significant attention since the 1960s, when animal production was rapidly intensifying and increasing. Farm animal welfare research began with a focus on the connection between animal biology and an animal's "welfare state," with the goal of both maximizing productivity as well as addressing the welfare needs of animals in production systems (Fox, 1980). More recently, there have been moves to improve farm animal welfare in Europe to reflect broader social values (Bock & Buller, 2013; Miele, Blokhuis, Bennett, & Bock, 2013), although we acknowledge that there are also members of the community who do not support animal production, and others for whom it is of little concern. In the USA, responses to community concern about animal welfare appear to have been more limited (Grandin, 2014). Australia, it could be argued, lies midway between Europe and the USA in terms of community attitudes to farm animal welfare and policy responses. Although animal agriculture is important both economically and culturally, Australia is highly urbanized, with 80% of people living in the major cities (Australian Government Department of Infrastructure and Regional Development, 2015). Surveys have shown that Australians believe that farmers do a good job of looking after their animals (Cockfield & Botterill, 2012), but research also has documented low levels of agricultural knowledge among the general public (Worsley, Wang, & Ridley, 2015). The treatment of farm animals has been a recent area of focus for activist groups such as Animals Australia. In 2011, a documentary on a prominent national current affairs program showed graphic footage of Australian cattle being mistreated in Indonesian abattoirs (Tiplady, Walsh, & Phillips, 2013). The resulting public outrage prompted the Australian government to cease the live export trade until welfare standards were improved. Eggs have become increasingly prominent in public discussions of farm animal welfare in Australia. The Animals Australia "No way to treat a lady" campaign, targeting caged-egg production, featured local celebrities, and used television and billboard advertising to encourage people not to buy eggs produced using caged hens (http://www.animalsaustralia.org/no-way-to-treat-a-lady). Other prominent campaigns have been aimed at the removal of intensive housing in the pig industry.

Until very recently (March 2016) (Han, 2016), there was no legally enforceable standard for eggs sold as "free-range." At the time that this research was performed, labels such as "free-range" could be used to describe a range of production systems where animals have access to the outdoors, and "cage-free" could include barn production systems with no access to the outdoors (Parker, Brunswick, & Kotey, 2013). Prior to the recent ruling, the only recourse that consumers or groups representing them could have was via challenge by the Australian Competition and Consumer Commission as misleading labelling or advertising; however, with no legal standard, it was largely up to the consumer to interpret these claims (Bray & Ankeny, 2015). Some critics contend that the new definition of "free range" is so liberal, given the number of hens permitted per hectare, that it still fails to satisfy expectations (Parker & Costa, 2016), and hence consumers should seek out additional information before purchasing egg products (Day, 2016).

The findings presented in this paper focus on egg products and are part of a larger project that aimed to examine Australians' understandings of "ethical" food choices and to explore the frameworks that people use to make decisions about what foodstuffs to purchase, in light of their own understandings of what makes one type of food "better" than another. As often occurs with qualitative research, participants sometimes took their responses into unexpected domains or emphasized particular issues much more than researchers might have anticipated.

In this study, we found that decisions to purchase (or avoid) egg products with animal welfare claims dominated conversations about humane animal production practices, although participants infrequently mentioned favoring free-range chicken meat, dolphin-safe tuna, grass-fed beef, and sow stall-free pork, among other food products perceived as "better." When participants were asked if there were any products that they avoided for ethical reasons or because of how that product might affect others, responses relating to animals included products containing palm oil, veal, and halal meat, in addition to cage eggs.

Hence, we specifically focus in this paper on why people were motivated to purchase certain types of egg products and in what ways they were perceived to be preferable to their "conventionally" produced counterparts. We were particularly interested in whether participants spontaneously offered explanations of their purchasing decisions in terms of ethical consumption or whether there were other factors associated with purchasing choices. We also sought to have participants articulate their reasoning behind the explanations that they provided, including factors such as knowledge of and trust in egg production systems. Finally, we sought to ascertain whether there were barriers to consumers making purchasing decisions that aligned with their values, for example price.

Methods

This research was approved by the University of Adelaide's Human Research Ethics Committee (H-2012-054) and conducted according to Australian national guidelines (National Health and Medical Research Council, the Australian Research Council and the Australian Vice-Chancellors' Committee, 2007). Our research took place in Adelaide, the capital city of the state of South Australia (population of approximately 1.2 million), with a large urban area surrounded by a number of agricultural regions.

Consistent with qualitative approaches (Denzin & Lincoln, 1994), we used focus groups and interviews to explore people's understandings of and motivations to buy food products, including those which explicitly make ethical claims or which they considered to be ethical products. Four focus groups, including a total of 31 people, took place in 2014. Participants (demographics provided below) were recruited through community announcements, newsletters, social media announcements, and flyers distributed at public events. Our focus groups lasted for approximately one hour and used semi-scripted, open-ended prompts that allowed participants to address the questions posed, explore the reasoning underlying their responses, and connect these understandings to other food practices, as well as broader social and ethical issues and concerns. Participants were asked to reflect on their regular food purchases and to identify anything that they thought of as being locally produced, organic, free from genetic modification, or produced in a way that promoted good animal welfare. They then were asked to explain why they purchased the particular items which they identified. In addition, participants were asked whether there was anything they avoided purchasing for ethical reasons. In this paper, we only report discussions directly related to animal welfare and eggs.

In addition to focus groups, we held 42 interviews at two suburban shopping centers in areas frequented by those of lower socio-economic status (based on postcodes and diverse ethnicities), to ensure that we were able to capture a range of views. These "mall intercepts" (Bush & Hair, 1985) involved inviting members of the general public at random to participate in our research. This methodology was utilized because we had some difficulties recruiting those from lower socio-economic groups for focus groups, and had the added advantage that people often were going to or from the grocery store when interviewed, making the issues

under discussion of immediate relevance. These interviews were based on a script that was modified from that used in the focus groups (i.e., they included discussion of other "ethical" categories in addition to animal welfare) to allow exploration of the issues in a shorter time frame (approximately 15–20 minutes) whilst still allowing participants to explore the reasoning behind their answers in dialogue with the interviewer.

Of the 73 total participants in the research, 70% were women. Age was distributed evenly between 18 and 24 years and 65+ age groups, with the lowest represented group being 35–44 (n = 8) and the highest represented group being 55–64 (n = 16). Fifty-five per cent were married or in a defacto relationship, 68% had children, and 54% were not currently working, which was also reflected in the high proportion (51%) of low income earners (indicating that they had a household income of less than AUD50,000 per year[1]). Seventy-five per cent lived in inner metropolitan areas based on residential postcodes and the Australian Standard Geographical Classification system. The educational profile of the participants was mixed: 29% had completed high school only, 22% had a vocational qualification, 22% had completed a university degree and 16% had postgraduate qualifications, and 23% were currently studying either full- or part-time.

The focus group and interview discussions were recorded digitally, transcribed, and anonymized, and checked for accuracy against hand-recorded notes taken by one of the researchers. The transcripts were treated as rich, narrative texts, and analysis was performed by one researcher coding the transcripts for major themes emerging from the data, similar to the "open coding" method described by Corbin and Strauss (1990), using a general inductive approach. Validity was checked by the second researcher by comparing these themes to those identified independently by her in the transcripts, and coding for consistency across the themes.

Results

Motivations for Purchasing/Eating Free-range and Cage-free Eggs

A strong theme that emerged from the data about motivating factors for purchasing and/or eating free-range or cage-free eggs was that participants associated these types of eggs with superior quality in comparison with their intensively produced counterparts. Quality was mentioned much more readily as a motivating factor for purchase rather than concerns for hen welfare. This finding highlights the contradictions present in the consumer/citizen discourse reported by Johnston (2008), and in particular suggests that the behavior of these consumers is directed more toward themselves, rather than the moral other (such as nonhuman animals, in this case, hens). Participants talked about the superior sensory characteristics of free-range eggs, in particular their taste and yolk color, and tended to attribute these characteristics to the animal's "more natural" diet (to be discussed in more detail below), as these quotes illustrate:

Researcher: And why do you buy [free-range eggs]?

Christine: Because the yolks are better.

Researcher: The yolks are better?

Christine: They're yellower.

Researcher: Okay and so [you buy them] less because of the way the chickens [are kept] and more because of the taste?

Christine: The different diet, the different diet.

Researcher: Oh the different diet that they have you think makes the better egg?

Christine: Oh I think so. Well they tend to be a bit more yellow. They're eating more natural stuff.

Julie: Oh I always like to buy free range eggs, yes.

Researcher: And why do you prefer free range?

Julie: Because they've got a much better color. And I'm originally a farm girl where our chooks[2] used to range outside.

Researcher: And so you like the color?

Julie: Yeah and I think they've got a better taste.

Free-range eggs also were said to provide greater nutritional benefits than their conventionally produced counterparts. Leaving aside the possibility that these products in fact may have superior attributes over caged-eggs (Hammershøj & Steenfeldt, 2015), we suggest that there seem to be other critical factors influencing the association between egg production system and quality. First, as it is highly unlikely that many participants have seen contemporary commercial egg production first hand, the main source of information at the point of purchase for most consumers about the production system is the label. Given the number of terms used to describe production systems on labels, our participants appear to be using these labels as "proxies" for categorizing products according to the binary of "good" and "bad" (Eden, 2011). However, the emphasis placed on superior sensory characteristics seems to suggest that our participants also are making an implicit association between free-range and a better, healthier product, and this tendency likely is a result of a "halo effect," where the evaluation of one attribute strongly influences another (Lee, Shimizu, Kniffin, & Wansink, 2013). The label itself may also influence perceptions of taste; it has been shown that people rate animal products labeled with "humane" as tastier than those with other labels (Anderson & Barrett, 2016).

The hen's diet was very important to our participants, and was used to explain how caged egg production was "not natural," in comparison to other production systems, more readily than freedom to roam or other behaviors. By their accounts, birds in free-range systems had more natural or better diets (as noted in the quotes above), mostly because of what they were thought *not* to be eating, specifically "chemicals" such as hormones and antibiotics. In addition, participants described hens in cages as being "force fed" substances that hens would not choose themselves; however, these substances were often described as unknown, at least in comparison with feed available in free-range systems:

Meera: I think it's tasteful [sic] and less chemicals for the kids. In the cage we don't know what they feed them. They said they feed chemicals. I did some research about that. So the kids, they're very fussy and I'm very fussy too. I smell [the food] and things like that.

Tony: Well because it's more fresh … it's a natural way [for] the chickens when they have their diet and naturally it comes out.

It is perhaps unsurprising that the participants in our study described caged egg production as "unnatural" when compared with free-range; however, it is the focus on animal diets that appears to be a novel finding with respect to preferences for non-caged eggs. Confinement is seen to restrict natural behaviors, but in particular it is seen as preventing the hens from consuming a "natural" diet. A general preference for "natural" foods, where natural relates to process of production more than content (Rozin, 2005), has been well documented, particularly in relation to genetically modified (GM) foods (Rozin, Fischler, & Shields-Argelès, 2012, Mielby, Sandøe, & Lassen, 2013). We suggest that it is the perceived role of "additives" in the hen's diet that is the main driver in our participants' descriptions of non-caged and free-range eggs as "natural." This interpretation echoes the findings of Rozin (2005) and Rozin, Fischler, and Shields-Argelès (2009), although we have identified no studies that specifically examine perceptions of egg-production methods. In addition, based on our participants' responses (e.g., see the comment by Daniel later in this

paper), we suggest that disgust, which has been found to influence food purity attitudes with respect to GM foods (Clifford & Wendell, 2016), also is closely aligned with preferences for non-caged eggs.

While some participants made specific links to substances in the hen's diet and their own (or family members') health, other participants made links between animal wellbeing and their own health:

Researcher: And so is the main reason why you buy those things [is] because of the way the animals are treated or is it also because you prefer those products?

Karen: Well the health benefit goes further. If you haven't got an animal pumped up full of chemicals, you're not ingesting those chemicals in a different form so it's what's better for the animal is better for me. Less stress on the animal because I always believe if the animal's stressed, you're going to eat stressed food, so it's not going to be as healthy.

Marilyn: I'd buy free-range eggs not the caged eggs any day, I think they are an excellent source of nutrition and I think that in, well as far as the freshness and the quality, I think that's very well regulated and I particularly like the eggs that you get with the little smiley face stamp on them.

Researcher: Why?

Marilyn: Because it makes you feel better … Happy egg, happy chicken.

The idea that "what is better for the animal is better for me" and that non-caged eggs were better for people to eat was thought to be obvious by our participants, though this conclusion was typically based on limited and subjective evidence. These associations between animal diet and wellbeing and egg quality, and the obviousness attributed to them, suggest that the participants felt that these factors affect the health of people who consume eggs from animals produced under intensive or conventional conditions, in a "you are what you eat" manner. Both of the quotes above illustrate what could be interpreted as "magical thinking," in particular the laws of contagion (in the case of the transmission of stress) and similarity (in the case of the happy face stamp being interpreted as both happy egg and chicken) described by Rozin, Millman and Nemeroff (1986). Magical thinking has been explored in relation to GM and organic foods (Saher, Lindeman, & Koivisto Hursti, 2006) and warrants further examination in relation to animal products.

Eggs Compared with Other Animal Products

Analysis of participants' responses reveals four key factors that help to explain the dominance of discussion of free-range eggs over other products with animal welfare claims, despite our study asking generic questions about ethics in relation to animal products. First, there were high levels of awareness about the use of cages in egg production, which participants thought was undesirable. Participants mentioned recent advertisements by activist groups as well as documentaries and the activities of celebrity chefs as sources of information:

Debra: The eggs … I prefer free-range because I watched this documentary on chickens and I've seen people that go, and I'm not being mean or stupid but apparently there was this doctor in England that did a test, I watched it, I couldn't believe it, free-range, too much chicken that you eat sending people literally crazy because the chickens aren't walking around in the field doing natural things—now because of Jamie Oliver and all the stuff he's been doing they stopped the caged stuff, they've slowed it down and they're trying now going back to the old-fashioned ways of no more sows in pens, they're doing free-range, everything's going back to the old-fashioned ways.

Second, participants compared free-range eggs with other products in their explanations, typically mentioning clearer labelling and prominent positioning within the supermarket as contributing to purchases of free-range eggs, as opposed to other animal welfare-related products. Free-range chicken meat was often noted to have unclear labelling and limited obvious benefits, as compared with the conventional product, especially given the attached price premium:

Gary: That's because everywhere we go they've all got free range written on the boxes … and price has got a lot to do with it too.

Researcher: And so do you look at the same sorts of things, free-range chicken for example?

Lauren: No, not so much, it seems really silly just to do it for eggs but not so much because I feel like it's not as easily packaged as the clear labels of caged and free-range.

Researcher: Yes, so eggs are really easy to pick, harder with meat?

Lauren: Yeah.

…

Lauren: Because the only thing yeah I associate [with] how the animal is treated is eggs because it's the most easy to see, so yeah.

Third, for many respondents (including one above who also mentioned labelling), the price difference between caged eggs and other products was perceived to be minimal enough that even those from lower socio-economic groups could purchase free-range despite the higher price. Participants seemed more willing to pay the additional price, estimated elsewhere to be approximately AUD0.30 per 100 grams extra (AUD1.80 extra for a dozen large eggs), on average, for free-range eggs (G. Mills 2016, personal communication [email], 17 April), whereas meat was already an expensive item; thus, meat with animal welfare claims was considered too pricey:

Amy: I won't buy caged eggs. I prefer free range or barn eggs.

Researcher: And why is that?

Amy: I don't like the idea of chickens being held in cages and forced to lay eggs for a living.

Researcher: So even with the price point, because they're usually a bit more expensive?

Amy: Yeah, I will look for the – I'll be willing to spend the extra money to buy eggs that aren't caged.

Researcher: So is buying free-range important to you?

Lauren: Yeah.

Researcher: Why?

Lauren: I am very [against] like animal cruelty and stuff like that, I would much rather spend the extra three or four dollars and know that the eggs are coming from chickens and hens who obviously are more looked after rather than caged hens, I just, I feel if I don't buy off them and if I can [make] other people to not buy off them, then they'll stop caging chickens.

Finally, because small numbers of hens for egg production now can be legally kept even in city locales, there has been a recent increase in "backyard chooks" in many Australian cities. Thus, some participants described preferring eggs from their own hens or sourcing them from friends or family, and described these as "free-range":

Karen: We're also looking at doing our own garden, starting up our own garden and things like that and just bought some chooks and they're definitely free range. They're out there, out by the back door, out by the lounge room.

Helen: I've solved the egg problem, I go out and just take them from underneath my chooks ... having chooks and that's the big new revolution, a lot of people, it's just, it's just gorgeous.

Jason: Actually, I get, my mate's chickens occasionally overlay, and he'll give me a dozen and they just taste so different from what we get and we're going "this is how it used to taste yeah" because they're not being mass produced … they eat the bugs and things like that and it's a more richer [sic], creamier taste.

According to their accounts, ideas related to ethical consumption were influencing the purchasing behaviors of people from lower socio-economic backgrounds; this finding is striking, given that price often is the dominant consideration for these consumers when purchasing food, and it reflects how deeply these ideas have penetrated throughout the community, particularly in urban areas. This finding echoes those of Johnston, Szabo, and Rodney (2011), that while people with lower incomes may engage less with what they describe as the "dominant ethical eating repertoire," they are not "unconcerned with the moral quandaries surrounding food choices" (p. 312). For several participants in our study, having their own hens, or getting eggs from family and friends with hens or access to them, were ways to get around the costs associated with free-range eggs and still allow them to consume what they perceived as "good" food.

Information and Trust

Increasing public concern about animal welfare in Australia is often linked with the so-called "urban-rural divide," referring to the distance between food producers and consumers, resulting in a lack of trust and knowledge in food production (Meyer, Coveney, Henderson, Ward, & Taylor, 2012). However, eggs provide an interesting counterexample, given increasing numbers of small urban flocks which allow even urban dwellers more direct contact with poultry and their rearing conditions and behaviors. Our participants talked about backyard egg production as a way to control "unknowns," particularly about what hens were being fed, and hence reduce the risks to which they and their families were exposed. In addition, having one's own hens was spoken about as a way of knowing about good farm animal welfare. Participants who had poultry as pets in the past, or who currently kept small numbers of hens for household egg production, used their personal knowledge to justify their claims that intensive production was cruel and "disgusting":

Daniel: Yeah and I guess I've always had chickens as pets.

Researcher: So you pay attention to chicken?

Daniel: Yeah. I know how disgusting it is. Like with cows it's not as bad but with chickens, it's like you see how cooped up they are, so I don't like that at all. I'd rather give them a little bit more space.

Backyard "chooks" may be more appropriately considered as pets than production animals (Elkhoraibi, Blatchford, Pitesky, & Mench, 2014), given their physical proximity to their owners as well as the resulting relationships, thus supporting a range of different values and associations than would be typical for food production animals. Thus, this topic warrants further investigation particularly given the rapid increase in the numbers of people keeping such animals in Australian cities.

Other participants spoke about people they knew as providing information about animal farming, growing up on farms, or visiting relatives' farms as children, or as previously noted, having poultry at home. This type of perceived personal proximity to animal production and the knowledge resulting from it was used to explain both how animals should be kept and what kind of products should be avoided:

Researcher: Yeah. Are those sorts of things important to you, free-range?

Andrea: Yes.

Andrea: Because as a child I grew up on a farm and it was a free-range farm, this was in Ireland, my grandparents, and I've seen the other way things … I've seen it as a child, so it is important to me.

The relationship between trust and risk reduction is characteristic of many contemporary consumer interactions, particularly in highly risk-adverse environments such as ours (Lupton, 1999). Trust was unsurprisingly extended to family and friends, but butchers also were seen as important sources of information on the provenance of particular goods and as such were seen as a preferred place to buy both meat and eggs:

Suzanne: I buy [free-range eggs] from the butcher because I know that he has them delivered down from Clare [an agricultural area north of Adelaide] … I often ask him, like just to reassure myself [that] the chickens are still free-range chicken.

However, given that there was infrequent discussion of additional information contained on the label such as stocking densities or voluntary certification, it seems that for most participants, basic labels provided enough information to enable them to choose one product over another (free range/cage-free over caged eggs) at the point of purchase. Despite this, many participants were skeptical of the labels and some had even attempted to verify the claims made by checking the companies' websites for details about conditions:

Researcher: Okay and when you for example buy the free-range eggs and so on, how do you know that they are in fact free-range?

Kate: I trust the box. Occasionally I'll Google it and find out if there's anything on the internet, pictures of the premises—I have done that before.

Discussion

Our findings show that there is a strong link between free-range (or cage-free) eggs and perceptions of quality that is motivating people to purchase these products, even though they are more expensive. More importantly, such motivations appear to be playing much greater roles among these consumers than considerations about animal welfare. There were high levels of awareness of caged-egg production compared with methods associated with other animal products such as meat, and strongly held perceptions that caged-egg production is "wrong," unnatural, and even disgusting, with diet and confinement being key (negative) aspects of conventional intensive production mentioned by our participants. However, these were only cited as secondary reasons why participants were buying free-range eggs, as their main focus was on quality. Hence, for those interested in promoting animal welfare, it is critical to note that purchasing preferences alone may not indicate increasing support for humane production processes. Instead, it is critical to engage with consumers around the values underlying their preferences in order to better comprehend evolving understandings of various ethical food categories.

The idea of animal "happiness," or at least emotional states of nonhuman animals, is increasingly becoming an important area of animal welfare science, as well as gaining prominence in the marketing of animal products. Miele (2011) suggests that the "invention" of the "happy chicken" is both "ambivalent and precarious" because happiness is presented as being a factor contributing to better-tasting food; however, many aspects of animals' lives are not covered by welfare claims on food. Our empirical research concurs, as our participants largely viewed the happiness of the chicken as "good" because of its influence on the eggs produced by them, rather than as "good for the chicken" as such.

The idea that free-range or cage-free production systems are better for hens was not questioned or critiqued by the participants in our study, despite the presence of factors that can

affect animal welfare in these systems, as it was not seen by them as central to their purchasing decisions. However, this reasoning poses a clear challenge for advocates of ethical or political consumerism, which ideally involves engagement and consideration of the issues involved and willingness to pay more for a product that involves the least harm to "others" (in this case, the hen). Critiques of the "industrialization" of free-range egg production (Parker & Costa, 2016) and the mainstreaming of "alternative" food movements more generally (Guthman, 2007) have highlighted various problems associated with harnessing consumer power. It could be argued that if perceptions of quality drive consumption of products that ultimately generate better welfare for laying hens, then a lack of engagement with ethical issues in egg production on the part of consumers may not matter. However, as highlighted by Parker and Costa (2016) and Miele (2011), ethical and animal welfare issues are not absent in free-range systems. In addition, if increasing consumption of free-range and cage-free eggs (along with other products with animal welfare claims) is being viewed by industry and government as an indicator of community concern for farm animal welfare, then estimates about the levels of concern, and resulting shifts in policy and/or production methods, may be based on false assumptions.

Overall, we contend that purchasing free-range or cage-free eggs was not considered to be an act of political consumerism with respect to farm animal welfare by most of our participants. However, the perception that caged-egg production was in various senses "bad" suggests that, as citizens, the participants in our study are not supportive of intensive egg production. More research is needed to understand and unpack community sentiments and explore whether policy changes, either with regard to production methods or labelling, even beyond recent regulatory changes, would be supported. What this study does reveal is that even within the "ethical consumption" domain, purchasing decisions are complex and include a range of factors that operate outside what most would strictly consider to be "ethical" considerations.

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Conflicts of Interest

We do not have any conflicts of interest to report.

Notes

1. AUD47,944 is the mean of the second quintile for annual gross income in Australia based on data from the Australian Bureau of Statistics (2015).
2. The term "chook" is Australian slang for a chicken.

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Food for Thought: Assessing Visitor Comfort and Attitudes toward Carcass Feeding at the ABQ BioPark Zoo

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ABSTRACT Enrichment is a key to keeping animals in zoos healthy and stimulated. For carnivores, the practice of feeding vertebrate animal carcasses, like those of goats or deer, or whole body prey animals like chickens or rabbits, can be an effective form of enrichment. While it is beneficial for animal care, carcass feeding may also be off-putting to some visitors. This research aimed to address this concern by describing the attitudes and comfort levels of visitors who viewed carcass feeding in three exhibits at the ABQ BioPark Zoo in Albuquerque, New Mexico: spotted hyena (*Crocuta crocuta*), Tasmanian devil (*Sarcophilus harrisii*), and African painted dog (*Lycaon pictus*). Results showed that visitors stayed at exhibits longer when a carcass was introduced and reported feeling generally comfortable and at ease while viewing carcass feeding. Findings also showed that visitors felt carcass feeding was beneficial to animal care and welfare.

Keywords: carcass feeding, carnivore enrichment, visitor attitudes, visitor study, zoo visitor attitudes, zoo visitor comfort

Zoo visitors associate characteristics like “active,” “free,” and “wild” with captive animals in enriched, natural-looking exhibits, and zoos are encouraged to use enrichment to alter animal exhibits and behavior in ways that please the visitor, while also working to decrease animal behaviors that are unappealing (Finlay, James, & Maple, 1988; Robinson, 1998). As Robinson (1998) explains, “Because public perceptions of the attractiveness of animal behavior may not coincide with welfare realities, there can be a tension between the requirements of desirable exhibits and those of maximally promoting animal welfare” (p. 151). For carnivores, the practice of carcass feeding—which falls under food

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enrichment—can be engaging (NAG, n.d.). It is an important component of food-based enrichment for carnivores (Altman, Gross, & Lowry, 2005; Bond & Lindburg, 1990; Cloutier & Packard, 2014; Mcphee, 2002).

The Association of Zoos and Aquariums (AZA) emphasizes the important balance between animal welfare and public engagement in its mission and accreditation standards (AZA, 2015). Modern zoos have embraced providing various forms of enrichment in exhibits for public viewing. Visitors connect with animals that are active and behaving naturally (Godinez, Fernandez, & Morrissey, 2013; Powell & Bullock, 2014), and carcass feeding has been linked to increased activity and display of natural behavior (Bond & Lindberg, 1990; Cloutier & Packard, 2014; McPhee, 2002). These data suggest that visitors would be content and engaged with carcass feeding because of its effect on the animals. However, the fact that the enrichment is another vertebrate mammal may present an interesting dilemma. In an article for *Slate* entitled "Let them eat carcass," Jason Goldman (2014) wrote that America's squeamishness harms zoo animals. We appreciate psychological distance between ourselves and the processed food we consume, and that harmful attitude is carrying over to what we expect to see in the zoo (Goldman, 2014). Despite the animal welfare benefit, zoos may be hesitant to offer alternative feeding methods, such as carcass feeding on exhibit, in part because of potentially negative reactions from visitors (McPhee, 2002; Veniga & Lemon, 2001; Young, 1997).

Much of the existing literature focuses on what zoo visitors believe their attitudes might be if they were to see an alternative feeding method such as carcass feeding. The few studies that have been conducted with zoo visitors who have seen carcass feedings indicate visitors have positive reactions toward the practice in general (Pratt, 2009; Veniga & Lemon, 2001). At the Western Plains Zoo in Dubbo, Australia, 44 zoo visitors were surveyed during a study that targeted carcass feeding as an enrichment practice for African painted dogs (Veniga & Lemon, 2001). The results were that 69.5% of visitors approved of the practice and 95.4% of visitors were not offended by it. Additionally, nearly all visitors found it to be of educational value, and around 30% thought of it as a necessity for the animals (Veniga & Lemon, 2001). Pratt's (2009) study yielded similar responses. Of 89 visitors who viewed a carcass feeding at the Monarto Zoo in southern Australia, 85% were comfortable with the practice (Pratt, 2009).

A recent study by Gaengler and Clum (2015), which asked visitors questions about potential reactions toward carcass feeding in an Andean Condor exhibit, showed that around 40% of zoo visitors at sites in New York, New Jersey, Connecticut, and Massachusetts would approve of viewing condors consuming a deer carcass. Another 40–45% of visitors would approve of the feeding, but weren't sure if they would want to view it (Gaengler & Clum, 2015). The majority of visitors also approved of viewing a fish, chicken, rat, or rabbit carcass feeding with the same species (Gaengler & Clum, 2015). Two studies have been conducted on what visitors believe their attitudes would be if they were to experience a live feeding. The findings of Cottle et al. (2010) and Ings et al. (1997) suggest that certain factors, such as visitor group composition and gender, may have a negative impact on their potential reaction when viewing a live feeding.

This research sought to address the issues presented here through describing the attitudes and comfort levels of visitors who viewed carcass feedings in three carnivore exhibits at the ABQ BioPark in Albuquerque, New Mexico.

Methods

Research Site

The ABQ BioPark Zoo in Albuquerque, NM is currently accredited by the AZA through September 2020 (AZA, n.d.) and was identified as suitable site for this research because they consistently carry out carcass feedings in public view with no prescribed prompting or interpretation (A. Harrell, personal communication, July 31, 2014). This study occurred with three species identified by zoo staff as receiving carcasses as part of an enrichment plan or under general husbandry (A. Harrell, personal communication, July 31, 2014); Tasmanian devils (*Sarcophilus harrisii*), African painted dogs (*Lycaon pictus*), and spotted hyenas (*Crocuta crocuta*).

Data Collection

Questionnaire: The data were collected over 12 non-consecutive days over three different periods, from February 21 through March 22, 2015. The Tasmanian devils received whole prey items such as quail, large rats, chickens, or rabbits for all except one of the research days.

A questionnaire was developed to include six Likert-type statements with 5-point response scales (from strongly disagree to strongly agree). Four of these statements assessed visitor attitudes toward carcass feeding, one addressed visitors' overall opinion of animal care at the ABQ BioPark Zoo, and the final statement addressed comfortability. This final question was followed by an open-ended question that asked visitors to describe why they rated their comfort level the way they did. To address visitors' emotions while viewing carcass feeding, they were asked to fill in the statement, "Watching an animal at the zoo consume a carcass makes me feel ____," where eight emotions were provided for them to circle. Two closed-ended questions on frequency of visitation to the zoo and whether or not they had ever viewed a carcass feeding in a zoo were asked to determine if visitors had ever seen the practice at the zoo or another facility before this occurrence. Visitors were also asked five demographic questions to ensure representation across group size and visitation. Finally, visitors were given the option to write in additional comment about their experience, at the bottom of the questionnaire.

Each questionnaire included consent language and a brief definition of carcass feeding to offer context to visitors who may not be aware of what they were viewing. In total, 242 questionnaires were completed; 95 were collected at the Tasmanian devil exhibit, 81 at the African painted dog exhibit, and 66 at the spotted hyena exhibit.

A convenience sampling strategy (Laerd Dissertation, n.d.) was used to administer the questionnaire; any visitor 18 years or older, who was observed viewing a carcass feeding, was approached. Most visitors took less than 5 minutes to complete the questionnaire.

During each data collection period, the hyenas and African painted dogs would receive one carcass—usually goat—typically lasting for a minimum of a few hours. Carcass feeding was determined to be finished when the researcher deemed the carcass to be no longer recognizable; visitors who viewed the exhibit after this point were not approached to complete a questionnaire.

Visitor Stay Times: Additionally, the researcher collected stay times of visitors who approached the exhibit. Time at exhibits has been shown to be an indicator of learning and engagement (Serrell, 1998). Stay time at each exhibit was recorded for visitors in one of two conditions; during a carcass feeding, and without a carcass present in the exhibit. Stay times with and without the carcass were always recorded on the same day to ensure environmental conditions would be similar.

During a carcass feeding, the researcher recorded stay times for 45 visitors (Tasmanian devil exhibit), 14 visitors (African painted dog exhibit), and 23 visitors (spotted hyena exhibit), for a total of 82 visitors. The same number of visitors were timed at each respective exhibit at times without a carcass feeding occurring.

Ethical Review

An application was submitted to the Internal Review Board within the Human Subjects Division at the University of Washington in Seattle, Washington. This research was determined by IRB to be exempt from full review and a certificate of exemption was received prior to conducting research. Reference code HSD #49045.

Results

Description of the Sample

Of the 240 questionnaire respondents who listed their gender, 58% were women. An analysis of group composition showed that 65% of respondents were in groups with both adults and children under the age of 18, while 33% of respondents were in groups of adults. Only 2% of respondents were visiting the ABQ BioPark Zoo alone. Of those who gave their zip code, 67% of them were from New Mexico and 39% were from Albuquerque. Most respondents were between the ages of 18 and 39 years of age. The majority of respondents had been to the zoo before, with 62% visiting at least once per year. Only 9% of visitors had seen a carcass feeding at the ABQ BioPark Zoo before. Another 9% of respondents had seen a carcass feeding at another site, and 82% had never seen a carcass feeding.

Visitor Stay Time

Independent *t*-tests for unequal variance revealed there were significant differences in stay times between visitors who viewed the exhibits in the absence and presence of a carcass feeding. Figure 1 displays mean stay time in the presence and absence of a carcass. Mean stay times by visitors at exhibits significantly increased by 1 min 45 sec (Tasmanian devil exhibit), 1 min 59 sec (spotted hyena exhibit) and 2 min 51 sec (African painted dog exhibit) while a carcass feeding was occurring.

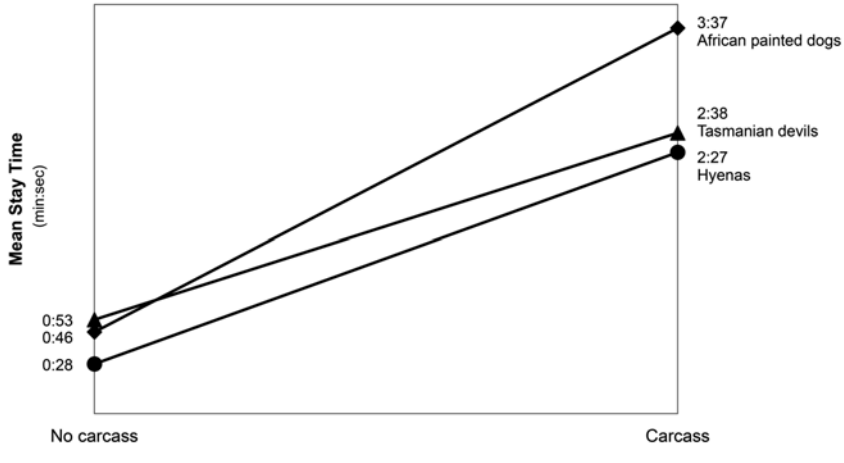

Figure 1. Mean visitor stay time at exhibits without a carcass and with a carcass present.

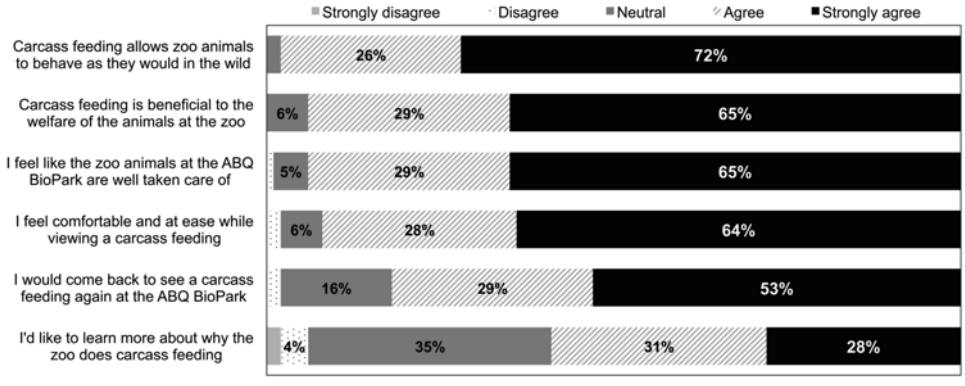

Figure 2. Visitor attitudes toward carcass feeding.

Visitor Comfort

Visitors were asked to respond to the following statement: "I feel comfortable and at ease while viewing a carcass feeding." As shown in Figure 2, 92% of the 242 visitors surveyed agreed or strongly agreed that they felt comfortable watching a carcass feeding. About 1% of visitors reported that they disagreed or strongly disagreed with this statement.

In addition to asking visitors to rate their comfort level, they were asked to say a few words about why they rated their comfort the way they did. Of the visitors who rated their comfort level, 41% elected to explain their rating. Responses were inductively coded into themes and are presented in Table 1. Overall, visitors wrote in positive comments that aligned with their reported comfort level. In a few instances, visitors who reported feeling comfortable found that the feedings could be also physically unsettling.

Table 1. Visitor comments related to their overall comfort level.

Visitor Comments	Percent of Cases	Examples
Natural Behavior	58%	"It's part of the circle of life" "It's just natural to eat for them that way" "This is natural and we wouldn't get to experience this otherwise"
Interesting/Exciting Experience	14%	"Because the study of animals is interesting and informative" "Thought it was pretty cool to see"
Positive Emotional Response with a Positive Response toward Animal Care	13%	"We know that these are wild animals, and it's not only beneficial for the animals, it's interesting for us to watch and learn" "We expect the ABQBioPark to do what is best for the animals"
Negative Emotional Response with a Positive Response toward Animal Care	9%	"It's sad to see a rabbit being eaten but I'm not sure if the [Tasmanian] devils need it to survive" "Sad for the goats, happy for hyenas"
Educational Experience	4%	"Educational for adults & children" "Great learning opportunity for my kids"
Hard to Watch	2%	"Sick to my stomach" "Hard to view"

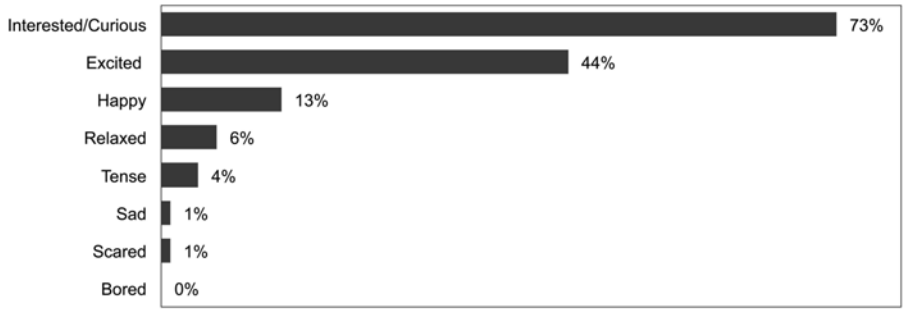

Figure 3. Visitor selection of emotions elicited by viewing carcass feeding.

There were no differences in comfort level between male and female responses to the feedings or between groups consisting of only adults versus groups with adults and children. Similarly, there was no difference in comfort level between those who had seen a carcass feeding before and those who had not.

Visitor Attitudes and Reactions

Visitors were asked to circle an emotion they most identified with after viewing the carcass feeding. Eight emotion options, four positive and four negative, were provided. The question was phrased as a fill-in-the-blank and encouraged visitors to select all emotions that applied. On average, visitors chose only one emotion, but some selected two or more, therefore percentages shown in Figure 3 sum over 100%.

As seen in Figure 3, visitors generally circled positive emotions, and the most common items circled together were "Interested/Curious" (73%) and "Excited" (44%). "Tense" was the most commonly reported negative emotion: seven respondents, making up 4% of cases, reported this; however, five of those respondents also circled "Excited" and/or "Interested/-Curious," and five of the seven agreed or strongly agreed that they were comfortable with watching the feeding. All three exhibits had at least one visitor who felt tense during the feedings. The 1% of cases for both "Sad" and "Scared" were from three and two respondents, respectively. Both visitors who reported feeling "Scared" viewed a feeding at the spotted hyena exhibit, and one of those visitors also selected "Sad." The other two visitors who reported feeling "Sad" were at the spotted hyena exhibit and the Tasmanian devil exhibit.

The Likert-type scale agreement statements echoed positive attitudes toward carcass feeding. The statements addressed visitor attitudes toward animal welfare and behavior, if they would like to learn more about the feedings, and if they would return to see another feeding. As demonstrated in Figure 2, visitors "Agree" or "Strongly Agree" with statements relating to animal care. Ninety-eight percent of respondents felt that carcass feeding encourages natural behaviors, and 93% of visitors "Agree" or "Strongly Agree" that the feedings are beneficial for the animals. Visitors also agreed with a general statement that animals are well taken care of at the BioPark, with 94% of visitors selecting "Agree" or "Strongly Agree." Respondents also reported that they were likely to come back to see another feeding. The statement that most visitors showed disagreement with—and the only statement that showed a "Strongly Disagree" response—was the statement about learning more about why the zoo does carcass feeding. Six percent of visitors either selected "Disagree" or "Strongly Disagree" for this statement.

Reliability analysis was run on the Likert-type scale statements to determine inter-item correlation. The statements were found to be reliable, with a Cronbach's alpha score of 0.797.

Discussion

Visitor Stay Time During Carcass Feedings

Overall, visitor stay time significantly increased during carcass feedings. Literature shows that visitors stay longer at exhibits with active animals (Clayton, Fraser, & Saunders, 2009; Godinez, Fernandez, & Morrissey, 2013) and that longer exhibit stay times may indicate deeper levels of potential learning or engagement (Serrell, 1998). Zoos may consider implementing carcass feedings not only as enrichment opportunities designed to benefit animal welfare, but also as strategies to enhance public engagement and education efforts.

Visitor Comfort with Carcass Feeding

Researchers and media spokespeople have suggested that visitors would be affronted or scared by carcass feeding (Boyce, 2007; McPhee, 2002; Veniga & Lemon, 2001; Young, 1997), Participants in this study, however, reported being very comfortable while viewing a carcass feeding. The results of this study are similar to those of an internal evaluation at the Toledo Zoo, where 98% of visitors were comfortable viewing carcass feeding (Boyce, 2007). Visitors responded more positively to carcass feeding in this case compared with similar studies conducted by Veniga & Lemon (2001) and Pratt (2009).

The suggestion that females would be more sensitive than men to the feeding because they show a greater emotional response toward animals (Cottle et al., 2010; Ings et al., 1997; Pratt, 2009) was also found to be false during this study. The gender ratio of this study was imbalanced toward females (58% identifying as female). Results showed that out of the visitors who "agreed" or "strongly agreed" with the feeding, 56% were female.

Out of the 156 respondents who reported being in a group with adults and children, 93% reported feeling comfortable with watching the feeding. Only two respondents in a group with children disagreed or strongly disagreed that they felt comfortable. Parents did not seem to feel Boyce's (2007) concern over children watching a feeding. These results indicate that groups with children were not deterred by the feedings. This is affirmed by some of the visitor comments, as well. When asked to say a few words about why they rated their comfort level the way they did, 4% of visitors answered that it was an educational experience for themselves and their children.

Visitor Attitudes Toward Carcass Feeding

When asked to identify an emotion that described how they felt while viewing a carcass feeding, the most common selections from visitors were "Interested/Curious" (73% of visitors) and/or "Excited" (44% of visitors). In addition, all of the positive emotion choices—"Interested/Curious," "Excited," "Happy," and "Relaxed"—were chosen with greater frequency than the negative emotion options.

The Likert-type scale statements pertaining to visitor attitudes toward carcass feeding demonstrated a positive response. First, visitors agreed that carcass feeding allows animals to simulate wild-type behaviors, with 98% agreeing or strongly agreeing with the statement. While viewing the feedings, visitors also agreed that carcass feeding is beneficial for animals and that the animals at the ABQ BioPark Zoo are well taken care of.

There was a smaller positive response to "I would like to learn more about why the zoo does carcass feeding," with 59% selecting "Agree" or "Strongly Agree." Open-ended visitor

comments relating to comfort may shed some light here. The majority of visitors—58%—described being comfortable because carcass feeding is natural: "It's a natural part of the animals' lives." These types of comments may suggest that visitors feel they already know why the zoo is using this type of enrichment, and do not need further explanation. This result could be examined in more detail in future research.

Limitations

There are some limitations to the methodology of this study. In the case of convenience sampling, there is the disadvantage of inherently including some researcher bias, as there is no protocol that mandates who the researcher approaches, which could affect generalizability (Lærd Dissertation, n.d.). The researcher attempted to mitigate this bias by approaching every person who recognized that carcass feed was occurring, whether they turned away or continued to watch. Some visitors did not elect to participate in the study, but the refusals were not related to the carcass feed. The reasons most often given were "I have no time" and "I don't take surveys." Overall, the refusal rate for the study was negligible—less than 2%.

Many factors aside from refusals affected total sample size, including weather conditions and regularity of feedings. The researcher was able to collect more data at the Tasmanian devil exhibit because they were fed a whole prey item on nearly every research day. Weather conditions also impacted the collection of data. On one of the African painted dog feeding days, the weather was very cold and only three questionnaires were collected, and the researcher was not able to time any groups. This impacted the overall amount of timing data for the African painted dog exhibit.

Conclusion

This research aimed to address concerns over visitors' comfort levels viewing carcass feeding and describe actual attitudes and comfort levels of visitors who viewed carcass feeding in three exhibits at the ABQ BioPark Zoo in Albuquerque, NM: spotted hyena, Tasmanian devil and African painted dog. This research took into account differences in group composition and gender, but did not take into account any differences based on geographic region or cultural affiliation. These should be considered areas for future research.

This study shows that visitors watch animals in exhibits longer when a carcass is introduced and are generally comfortable with viewing carcass feeding. Most visitors explained that the practice of carcass feeding seemed natural to them or that they believe the practice of carcass feeding was natural and beneficial for the animals, even in the few instances where visitors identified that they were uncomfortable with watching it. Visitors have positive attitudes toward carcass feeding, most frequently describing it as interesting and exciting. The findings of this research suggest that zoos and aquariums may not need to be overly concerned with visitor reactions when considering carcass feeding in public view.

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Conflicts of Interest

The authors report no conflicts of interest.

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The Indignity of Relative Concepts of Animal Dignity: A Qualitative Study of People Working with Nonhuman Animals

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ABSTRACT The Swiss animal welfare legislation is considered to be one of the strictest such laws worldwide. One unique feature is the inclusion of the concept of "dignity of the creature" and, more precisely, animal dignity. We interviewed 19 people from Switzerland and Germany about their concepts of animal dignity. Thereby, we investigated whether the very specific concept of the Swiss law is reflected in the minds of those who work with nonhuman animals on a daily basis. The results of our qualitative interviews revealed an awareness of the legal term among Swiss interviewees, but their personal concepts of animal dignity were not based on or similar to the legal definitions. The interviewed participants presented a broad range of concepts, including: similarities to human dignity, replacing concepts such as respect or integrity, and context-dependent, contingent forms of dignity. The applicability or usefulness of animal dignity was questioned by several participants; many judged it to be confusing or difficult. Therefore, we conclude by discussing animal integrity as an alternative concept that reflects the interviewees' ideas of treating nonhuman animals in a respectful and appropriate way, and at the same time does not have the strongly metaphysical connotations of a concept such as human dignity.

Keywords: animal ethics, dignity, integrity, moral intuitions, qualitative research

In 1992, the Swiss public voted in a referendum to include an article on the "dignity of the creature" in the Federal Constitution (today: paragraph 120, "Gentechnologie im Ausserhumanbereich"). In 2008, animal dignity[1] was defined in paragraph 3 of the Swiss Animal Welfare Act. Reactions in academia to both these

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legislative actions were ambivalent. On the one hand, it was considered progress and regarded as setting a good example for the contemporary treatment of nonhuman animals[2] (NHAs)—and also for how we interact with plants (Rippe, 2011). Extending animal welfare beyond sentientist[3] aspects was seen as something unique and an advantage for NHAs (Schindler, 2013). On the other hand, the term "dignity" was discussed actively because the analogy to human dignity was questioned (Baranzke, 2002; Balzer, Rippe, & Schaber, 2008; Teutsch, 2008), the practical implications were considered unclear (Feiedli, 2009; Schmidt, 2008), and the legal benefit was doubtful (Binder, 2011).

Paragraph 3 of the Animal Welfare Act reads[4]:

a. dignity: Inherent worth of the animal that has to [sic] respected when dealing with it. If any strain imposed on the animal cannot be justified by overriding interests, this constitutes a disregard for the animal's dignity. Strain is deemed to be present in particular if pain, suffering or harm is inflicted on the animal, if it is exposed to anxiety or humiliation, if there is major interference with its appearance or its abilities or if it is excessively instrumentalised.

The ECAE[5] (2010) criticized the lack of precision in and partial contradictions within and between the Federal Constitution and the Animal Welfare Act regarding both terminology and the practical implications of animal dignity. In the view of the ECAE, animal dignity, in contrast to human dignity, is a quantitative and therefore relative concept that is synonymous with the inherent worth of an animal. It can be respected through the weighing of goods, that is, human interests are weighed against the interests of NHAs that might be harmed. This implies that there is no action that disregards an NHA's dignity *per se*. The stress that is imposed upon an NHA must always be compared to the potentially overriding interests of humans. The profound distinction between this and the concept of human dignity presents a potential challenge to folk intuition[6]: it might be difficult to understand a familiar concept in a second, fundamentally different way.

In an advisory opinion, Praetorius and Saladin (1996) emphasize that changing the law was only the first step in a process of societal and cultural change:

The constitutional provision that takes into account the dignity of the creature requires more than individual, narrowly defined exceptions to the property status of animals, plants and other organisms. If the meaning of the term "dignity" is taken seriously in the European tradition it requires a "Copernican Turn" in [public] consciousness, which cannot be ordered by law, but which can be promoted by a new trendsetting constitutional provision. If we sketch the term dignity of the creature—which is directed to practicality in the near future—in the following we do not thereby retract the claim that it is aiming at far-reaching processes of cultural change.

In this study, we took public perceptions of animal dignity as a starting point.[7] By interviewing 19 persons from Germany and Switzerland who deal and/or live with NHAs on a daily basis, we wanted to explore the following questions:

- Do they mention animal dignity without being asked about it?
- How do they define animal dignity, especially compared to human dignity?
- Do they make references to the law?
- Are the Swiss interviewees aware of the specificities of the law regarding application of the dignity concept?
- Do they judge the concept to be clear, useful, or important, particularly for their daily work with animals? Which examples do they give in that context?

- Is the cultural and societal change that begins in the individual's conscience (that Praetorius & Saladin (1996) hoped for) already on its way?

As this sample of "animal experts" was selected deliberately, we do not cover the opinions of the broader public of Switzerland and Germany. Rather, we aimed at revealing the concepts used by those who are likely to have a strong opinion about the treatment of NHAs due to their close relationship with animal individuals. We expected to find a broad range of statements regarding animal dignity and potentially some specific opinions regarding the law in the small Swiss sub-sample. Based on our exploratory findings, a strong candidate for an alternative concept will be discussed: animal integrity, as promoted, for example, by Schmidt (2008) and Rutgers and Heeger (1999). According to their frequently quoted definition (Heeger, 2000; Bovemkerk, Brom, & Van Den Bergh, 2002; Musschenga, 2002; Gavrell Ortiz, 2004; De Vries, 2006; Marie, 2006; Verhoog, 2007), animal integrity is "the wholeness and completeness of the animal and the species-specific balance of the creature, as well as the animal's capacity to maintain itself independently in an environment suitable to the species" (Rutgers & Heeger, 1999, p. 45). Like dignity, integrity comprises more than sentientist aspects. It is not only about a creature's subjective experience, but also adds the objective criteria of what it means to be alive, to be a member of a certain species and to have certain natural properties.

Methods

The ethics committee for Basel (formerly "Ethikkommission Beider Basel," now "Ethikkommission Nordwest- und Zentralschweiz") was informed about the research project and gave their approval.

Recruitment

The participants in this study were persons with different kinds of relationships to nonhuman animals. As we sought to cover a broad spectrum of opinions, experiences and perspectives, people, associations, or institutions in the following categories were contacted purposively via email or telephone: agricultural scientists, animal liberation activists, animal shelter workers, animal transportation enterprises, animal welfare officers, bee keepers, biologists, butchers/slaughtering facilities, circuses, hunters, horse riding/training centers, falconers, farmers, forest rangers, "pet" shops, caretakers of companion animals, rescue dog trainers/centers, veterinarians, wildlife parks, and zoos.

The only other inclusion criterion was the ability to speak German. For logistical reasons, recruitment was limited to northern Switzerland and southern Germany, around Basel as well as the Ruhr area (Germany). The recruitment and interview period lasted from September 2013 until February 2015.

Participants

A total of 19 persons were interviewed, eight of whom were Swiss (animal welfare officer,[8] biologist, circus manager, farmer, forest ranger, veterinarian, wildlife park manager, and zoo keeper) and 11 German (agricultural scientist, animal liberation activist, bee keeper,[9] stablehand,[10] falconer, farmer, caretaker of companion animals, animal shelter workers,[11] animal park keeper, and veterinarian). Nine were female and 10 were male. Their ages ranged from around 30 to the age of retirement. Other demographic data were not collected as the study was not aiming to detect psychological predictors or make group comparisons, but rather to

explore a broad spectrum of perspectives. All participants gave their consent to the use of their anonymized quotations in this study.

Interviews

The interview guide for the semi-structured interviews had three blocks of interview questions that were in part adapted to the interviewee's activities with animals. The first part enquired about personal experiences with nonhuman animals during childhood and adult life.

The second block addressed personal opinions, concepts, and perspectives on human–animal relationships. Topics included animal welfare (laws), communication with NHAs, NHA individuals/characteristics/personalities, attitudes towards treatment of NHAs, and follow-up questions derived from the first, more narrative block.

In the third block, participants were asked to comment on abstract terms: the purpose of an animal, rights of an animal, dignity of an animal, freedom of an animal, and value of an animal. Many of the quotations used for this paper are derived from participants' answers to the request "Please describe what you associate with the following term: dignity of an animal."

In total, the interview guide contained 10 to 12 main questions with some sub- or follow-up questions. The interviews were conducted by one of the authors (KP), transcribed verbatim by the same person, and anonymized.[12] The quotations used in this paper were translated from German into English by one of the authors (KP) and checked by a member of the team.

Analysis

After thorough reading through the transcripts, the coding was done as a qualitative thematic analysis according to Braun and Clarke (2006) by KP and another member of the team, with MAXQDA. Both analysts worked independently in a first phase of the analysis and compared their codes in a second phase in which themes were defined.

In a first step, personal experiences, opinions, and understandings of the participants were identified. We do not describe the richness of our data set here but focus on an in-depth account of an aspect we specifically asked about: animal dignity. For the rather narrow topic of this paper, the coding was therefore mainly deductive. Several explicit and some latent aspects that were linked to dignity formed themes (see results). Those were analyzed with regard to legal (Swiss animal welfare law) and philosophical concepts of dignity.

Results

Dignity as a Legal Concept

As the dignity of the creature is a concept that is unique to Swiss Law, it was expected that only Swiss interviewees would link the term to the constitution. Indeed, Swiss participants made frequent references to Swiss law when they were asked about the dignity of animals. Most of them seemed to be aware that dignity is a legal concept:

Interviewer (I): What about "dignity" of an animal?

Animal Welfare Officer (AWO): Yes, is always very controversial […] It has been included in the law now […]

Forest ranger: […] Dignity is indeed defined by the law, it comprises quite a lot.

Farmer 2: What is dignity (laughing)? Yes. That is of course a term, we have it in, in the context of the animal welfare act, so: The dignity of the creature is, not to let it overwork. Not to torture, so that is for me dignity of the animal.

The only interviewee who brought up dignity spontaneously was Swiss; he even stressed that "for me the issue 'dignity' is really crucial." At the same time, challenges and difficulties with

the term were mentioned and its applicability was fundamentally questioned—especially by those who were familiar with the law:

AWO: […] but is, of course, very, very difficult to judge. So, almost not at all […] For me it is difficult to judge when dignity is violated, actually […] excessive instrumentalization is also such a term that was included in the law. I find that difficult to judge. So, for the experiments I find it almost impossible to judge when an animal's dignity is violated.

Forest ranger: And I just think—the dignity of animals, that is very difficult.

Vet 1: Is a very difficult topic […] Very, very difficult. So, I cannot give you any good definition within 5 minutes.

Different Concepts of Dignity

There were several approaches to defining and describing dignity as a concept. Three patterns were found: comparing animal dignity with human dignity, defining animal dignity independently of human dignity (mostly replacing it with other concepts), and describing it by giving examples (mostly of anthropomorphizations).

Similarity or Equivocation of Animal and Human Dignity: Similarity or even equivocation between animal and human dignity was stressed by some interviewees:

Animal Shelter 1 (AS1): Animal dignity is inviolable, like human dignity. Yes.

I: Could you somehow define a difference between animal dignity and human dignity?

Agricultural Scientist (AgS): No, because the word "dignity" has, from my point of view, such a focus of something universal, that there is no difference.

Caretaker of Companion Animals (CCA): Every living being does have a dignity, which means, yes, similar to humans, "is inviolable," or at least it should be. Which is, unfortunately, not always the case for humans, either.

It is also remarkable that the consequences of transferring the concept of human dignity to animals were already problematized by the AgS: "And therefore I indeed have the problem that, if I grant complete dignity to the animal, that I cannot say any longer I use it for my purposes. I'd have to grant total freedom to it […] one is, from my point of view, no longer allowed to use an animal for human consumption."

A related issue was addressed in an expressive way by an Animal Liberation Activist: "[…] I once [saw on TV] such a restaurant guy […] and they prepared a roast goose, I think. And the dead goose lay there and [he] said he does not want people to play with it. He wants them, quasi, to accept the dignity of this dead goose. And I thought: You damn asshole!" She, too, seems to judge respecting an animal's dignity as incompatible with killing them for consumption purposes.

Animal Dignity—Inherent Value & Different from Human Dignity: Similar considerations may underlie reasons for defining animal dignity in different ways, without comparing it to the concept of human dignity. One frequently used expression was "respect":

Zoo keeper: So, I find, if one pays respect to an animal, then you leave him also a certain dignity. Automatically, because one does not force him to [do] anything.

Farmer I: […] just, in principle, continuously pay respect to an animal. That is part of it [my work/my relationship with animals] for me.

Forest Ranger: From my point of view, an animal is given dignity if I respect the animal as an animal […]. I think: Good knowledge about species, good knowledge about behavior and respect for the creature, then I am very close to animal dignity.

AgS: So, dignity would mean, then, if I respect them until death […].

Although the nature of actions expressing "respect" for animals in these passages remains rather vague, it seems to be a term that interviewees attribute to a positive attitude towards animals; something that is expected when treating animals. Respect is also mentioned in other contexts, for example:

Circus manager: An animal's right is: It must be respected, it must be treated decently.

Zoo keeper: Indeed, pay respect and then it has to do with an animal's value, for me.

I: [What do you associate with the following term:] Value of an animal?

Bee keeper: Not putting it on the level of a human but still, yes, respecting.

Biologist: And I also tell people. The students I work with, they should actually have awareness of that: That is an animal and treat it like that, treat it with a certain respect.

Farmer I: And I would also say that animals, yes, also have a certain kind of soul. Therefore I […] said it is important to pay respect to the animals.

Bee keeper and biologist and farmer here define respecting animals as something that is part of treating animals as animals (not humans, and not anything else). Thereby, respecting them becomes part of acknowledging their moral status, be it based on dignity, value, soul, or any other concept.

Some interviewees brought up ideas that resemble concepts of integrity rather than of dignity:

I: What do you associate with the term: dignity of an animal?

Bee keeper: Species-appropriate keeping.

Forest ranger: […] and try to give it a life approximate to how it takes place in nature.

Vet I: To me it seems […] maybe more dignified if a farmer […] tries to give that instinctive mother cow–calf relationship to his animals […] but stands by his opinion and says: In the end, you will be slaughtered. Than if someone puts a garter snake from a South American swamp in a Swiss bath tub and later brings it to me, half dead […]. And then he even feels good about it, so he has the impression he did something good for the animal.

Circus manager: Dignity of an animal [means that] you should ask of an animal what it would actually do in the wild.

Farmer II: […] That does not mean that a cow if she gives 40 liters or 50 liters of milk a day, that it is against dignity. I don't think so; if keeping is appropriate, if especially feeding is appropriate; the animal stays healthy; then I would not consider dignity scratched [sic].

Dignity is connected to something in the animal's nature in these cases. Considering individual and species-specific needs implies not detaching the animal from its natural environment and behavior and forcing human ideas on it, and appears to be the guiding rule for this understanding of dignity.

The animal-park keeper even pointed out that the important difference between human and animal dignity was that "humans, who don't respect others' dignity, they don't have a right to any kind of dignity […] Because they just lose it. I don't see it that way with animals." This uncommon view presents animal dignity as something absolute, whereas human dignity can be temporarily lost.

Anthropomorphization as a Violation of Animal Dignity: Finally, some examples revealed a contingent concept of dignity: interviewees associated dignity with context-dependent aspects, humiliation, and anthropomorphizing. They did not give a definition but provided examples when asked about violation of animal dignity:

AWO: So if I see a purple dog, dignity is maybe violated.

Animal Shelter I: Others totally humanize their animals. And that is just—that is a no-go. And many only mean well when they put shoes on them and a scarf and a cap and what-not […] that is degrading.

Circus manager: So, in the 50s they presented dogs with hats on their head and dressed monkeys and such, that is not done any longer, is it?

Animal Shelter II: Brushing [the animals'] teeth every evening, prophylactically.

Discussion

Our results show that the EKAH's interpretation of "dignity" in the Swiss law appears to be only partially reflected in our interviewees' concepts of animal morality.

Dignity as a Legal Concept

On the one hand, Swiss interviewees were well aware of the concept of dignity as something with legal force. The majority of them described the legal term as difficult and challenging; even—and especially—when they had to deal with that part of the law professionally (the AWO, the forest ranger, the vet). This perspective can be explained by the very different definitions of and concepts related to dignity mentioned by participants.

Different Concepts of Dignity

Similarity of or Equivocation between Animal and Human Dignity: Although the main discourse clearly distinguishes between human and animal (creature) dignity, folk concepts do not reflect this strict separation. Those who attributed "inviolable dignity"[13] to animals did not refer to a contingent, but rather to an inherent version of dignity, one that is unquestionable and absolute. This concept would not include weighing of goods as part of the definition of dignity. Explicitly stating that there was no difference between human and animal dignity, several interviewees' statements suggest that Rippe (2011) was wrong to claim that neither lawyers nor lay people had difficulties separating the two dignity concepts.

The law explicitly states that strain is imposed on NHAs if they are exposed to "humiliation." However, "humiliation" as a human-related concept requires self-awareness and the ability to subjectively experience degradation. These requirements are not usually attributed to NHAs (Balzer et al., 2008; Schmidt, 2008).

As the agricultural scientist and the animal welfare activist pointed out, the overall treatment of NHAs would have to be modified fundamentally if human and animal dignity referred to the same concept, especially regarding farming and killing them for human consumption, but also regarding animal experimentation. As it was originally written with a focus on animal experimentation, article 120 of the Swiss constitution cannot imply this understanding. Though massively criticized for scientific and ethical reasons, animal experiments are still considered essential by scientists in areas such as biomedical research: pre-clinical testing of drugs and devices on NHAs are a (legal) necessity before they are tested on humans. If animals' dignity was considered inviolable like human dignity, this requirement could not be justified.

The law is vague concerning the relationship between human and animal dignity, especially with regard to the concept of humiliation, which is broadly perceived as anthropomorphic, and the concept of weighing of interests, which is usually not associated with human dignity. The legally assumed fundamental difference between human and animal dignity has been discussed as similar to other ambivalent legal concepts (Rippe, 2011) on the one hand, or as significantly changing the core meaning of dignity, on the other (Binder, 2011).

In contrast, a close link between human and animal dignity was not intuitively excluded by our participants.

Animal Dignity—Inherent Value & Different from Human Dignity: The pluralistic understanding of dignity became most obvious in the interviewees' attempts to replace it with alternative concepts. The frequently used "respect" is primarily a place-holder for other concepts. It must also be defined, at least when applied to such a practical thing as treatment. Classifying the term among ethical concepts leads to Albert Schweitzer's "Ehrfurcht vor dem Leben" (reverence/awe for life). Like dignity, this concept is rooted in Christianity and applies to all living creatures. The core of Schweitzer's concept, the idea of being alive, striving for life, and sharing that experience with all other creatures, fits the context in which interviewees brought up "respect": not forcing others, respecting them "as animals," respecting them until death, or because they have a soul. These aspects give some impression of what it means to be alive—for us as well as for NHAs: being defined by our natural limitations, having individual interests and needs, being finite (Schweitzer, 2008). When the biologist says "they should actually have awareness of that: That it is an animal and treat it like that, treat it with certain respect," he reveals an attitude that resembles Schweitzer's approach. Furthermore, in their ethical guidelines for animal experiments, the Swiss Academies of Arts and Sciences explicitly refer to "Ehrfurcht vor dem Leben" as a core concept for their work.[14] Remarkably, one interviewee described dignity and value of NHAs in the same way (as paying respect to them), indicating that the connection with inherent value claimed by the Swiss constitution is reflected in folk moral understanding.

Another approach is presented by Rutgers and Heeger (1999), who differentiate between the "inherent value," the "intrinsic value," and the "inherent worth"[15] of an animal: "Inherent worth is related to a basic attitude of moral respect. We propose to describe this attitude as respect for animal integrity" (Rutgers & Heeger, 1999, p. 50). In line with Schmidt's (2008) suggestion, animal integrity is promoted as a concept that corresponds to both moral intuition and the need for objective criteria. When the forest ranger states: "Good knowledge about species, good knowledge about behavior and respect for the creature, then I am very close to animal dignity," he directly refers to the species-specific properties that are considered in the "classic definition" of animal integrity (De Vries, 2006). Verhoog (2007) suggests that NHAs are perceived in a holistic way in our everyday life. Therefore, our concern is not limited to their sentience but to other genuine properties—which is confirmed by our interviewees when talking about respecting them "as animals." Their intuitive associations with the term "animal dignity" seem to be included more fundamentally in the classic definition of animal integrity (Verhoog, 2007).

Only one interviewee presented an exceptional view: disrespectful human behavior might cause the loss of dignity, whereas NHAs cannot lose theirs. Apparently, the concepts of human dignity can differ strongly, just like concepts of animal dignity. Against that background, it seems even more challenging to define animal dignity in terms of the concept of human dignity.

Contingent Concepts of Animal Dignity: The list of anthropomorphizations indicates that dignity is not limited to the universal and inherent property mentioned above, but that it can also be seen as context-dependent or temporary. In the interviewees' opinion, this seems especially the case for cases when dignity is "violated." According to this negative definition, dignity is most visible when it is disregarded or lost. The interviewees' examples describe situations that seem exposing or unmasking from a subjective point of view—similar to what would be called humiliating from a human perspective. *Prima facie* it seems paradoxical that, according to that definition, NHAs are humiliated when they are treated as humans. However,

these treatments again seem to affect the animals' integrity. If we want to do justice to them, we must treat them appropriately, which also means not imposing human habits, matters of appearance, or hygiene on them.

Limitations

Having interviewed 19 persons dealing with NHAs on a daily basis, we cannot claim representativeness for any professional group or the general population. Additionally, the interviewees did not prepare for questions about abstract concepts such as dignity. Comparing their spontaneous answers to philosophical or legal approaches might not do them justice. However, no one was unable to explain their view or associations. All of them had at least an intuitive idea or gave examples related to animal dignity. Therefore, we consider our analysis justified.

Conclusion

Overall, the spectrum of aspects of animal dignity presented by the comparatively small number of participants shows that it remains a diffuse term with various connotations. As such it must be treated with caution, and the applicability of the Swiss Animal Welfare Law can be questioned. The practical stance and change in the individual's conscience that Praetorius and Saladin (1996) hoped for are not supported by our data. The literature strongly supports these findings (Binder, 2011; Hoerster, 2004; Schmidt, 2008). Many interviewees showed an implicit preference for the integrity concept as described by Schmidt (2008) and suggested by the French translation of the Swiss constitution.[16] On the one hand, frequently used definitions of animal integrity, such as Rutgers' and Heeger's, refer to a concept that is very close to the ECAE's definition of animal dignity. On the other hand, "integrity" is not challenged by the problematic metaphysical connotation which human dignity presents for animal dignity. According to our results, the relativity and weighing of goods is a strongly counterintuitive aspect of the Swiss/EKAH concept of dignity. None of the study participants associated this with dignity in any way. Those who need to deal with it professionally admitted facing difficulties in weighing dignity against benefits. Respecting dignity was not understood—as dictated by the law—as the weighing process itself. This might be supported by the fact that the law does not give any details on how to weigh human interests and (potential) benefits against the stress imposed on NHAs (Friedli, 2009).

Therefore, the question remains: Why stick to a confusing concept when a better alternative is at hand? The available literature (Schindler, 2013) does not give any reason to prefer it from a legal point of view. Based on our interview data from the broad field of human–animal interaction and on supporting claims from the literature, we suggest the (consistent) use of the term "integrity" instead. Although animal integrity has already been implemented in animal welfare policy in the Netherlands, its application for certain domains like genetic engineering is still being discussed (De Vries, 2006; Gavrell Ortiz, 2004; Heeger, 2000). In a declaration regarding the translation of "animal dignity" in the German version of the Swiss constitution into the French "intégrité des organismes vivants," the Swiss Ethics Committee on Non-human Gene Technology explicitly disagrees with the use of "integrity" in their constitution (Eidgenössische Ethikkommission für die Gentechnik im ausserhumanen Bereich, 2000). However, in their declaration they mention that not every violation against animal integrity would disregard animal dignity. Apparently, it is not in this committee's interest to protect full animal integrity. However, our data show that this would be of interest to people who apply the animal welfare laws in their everyday life. In the sense of Rutgers' and Heeger's definition, integrity is more

application-oriented, distinct, in line with moral intuitions and specifications of the law, and avoids any metaphysical background assumptions that come with (human) dignity. Whether the findings of this qualitative study represent the opinion of a majority of the relevant population will have to be tested in a follow-up quantitative study.

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Conflicts of Interest

The authors state there are no conflicts of interest.

Notes

1. Note that "dignity of the creature" includes plants, whereas the Animal Welfare Act only refers to "animal dignity." The detailed definition given below is therefore only applicable for animals, not for other creatures.
2. The correct but lengthy term "nonhuman animal" will be replaced by "NHA" in this paper for practical purposes.
3. Animal Welfare Legislation is usually limited to restrictions about harming, damaging, or causing suffering to NHAs (see, e.g., German Animal Welfare Act). The aspects of humiliation and excessive instrumentalization clearly add to that because they do not refer to the animal being sentient.
4. There is no official English translation of the Animal Welfare Act. Therefore, we used the version initialized and co-financed by Interpharma that is provided for information purposes only. https://www.globalanimallaw.org/downloads/database/national/switzerland/Tierschutzgesetz-2005-EN-2011.pdf.
5. ECAE: Ethics Committee for Animal Experimentation of the Swiss Academy of Medical Sciences and the Swiss Academy of Sciences. In German: Ethikkommission für Tierversuche der Akademien der Wissenschaften Schweiz.
6. By "folk intuition" we refer to a general public who is not immediately involved in the legal/philosophical discussion. The term is neither meant in a judgmental way nor do we claim to provide a sample of interviewees that is representative of the population as a whole.
7. The reported results are part of a larger study that looked into different aspects of human–animal relations, such as moral status, the importance of individual encounters with animals, or abstract concepts like value of an animal or freedom of an animal. In this article, we only report the aspects that are linked to animal dignity.
8. There are animal welfare officers employed by the cantons and by different institutions and enterprises in Switzerland.
9. As a hobby, not a profession.
10. Owning a horse farm.
11. As a hobby, not a profession.
12. The interviewees are characterized by their occupation or otherwise by their relation to ("Bee keeper"; "Animal Shelter"). If there were several individuals with the same status, they were numbered ("Farmer I"; "Farmer II").
13. In the German but not in the Swiss constitution, human dignity is characterized as "inviolable." In the Swiss constitution, paragraph 7, it merely reads: "Die Würde des Menschen ist zu achten und zu schützen."
14. http://www.akademien-schweiz.ch/dms/D/Publikationen/Richtlinien_Empfehlungen/Tierversuche/Richtlinien_2010.pdf.
15. According to Rutgers and Heeger, the "inherent value" is based on human appreciation of certain NHAs. If the appreciation stops, the value is lost. "Intrinsic value" stems from a creature's interests and ability to suffer. Events can have a positive or negative intrinsic value for those animals that are sentient and conscious; and these events are to be morally considered. "Inherent worth" attributes NHAs a "good of their own" that goes beyond subjective experience and includes species-specific appearance, behavior, and other biological functions. Respecting the inherent worth seems comparable to respecting the Swiss constitution, preventing humiliation, major interference with the animal's appearance or abilities, and excessive instrumentalization.
16. When translating the German version of paragraph 120 of the constitution into French, the term "dignité de la créature" was changed to "Intégrité des organismes vivants." In a position statement, the Federal Ethics

Committee on Non-Human Biotechnology strongly advised against this change as they considered dignity and integrity to be different. http://www.ekah.admin.ch/fileadmin/_migrated/content_uploads/d-Stellungnahme-FrVers-Art129BV-2000_03.pdf; accessed: 09.03.2016.

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Giving More to Humans than to Animals in Need? A Behavioral Measure of Animal–Human Continuity in Large-scale Surveys

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ABSTRACT Survey research on attitudes and behavior toward animals is affected by the hypothetical character of behavioral measurements and socially desirable responses. Drawing on previous research in the fields of environmental behavior and behavioral economics, we combined the advantages of incentivized behavioral experiments and large-scale surveys by asking 2,299 participants in "dictator games" to allocate 10 euros between a charity for poverty reduction and themselves, as well as between a charity for animal protection and themselves (presented in counterbalanced order, with 200 allocations paid to the charities and participants). On average, participants donated approximately 70% of the 10 euros to each charity but donated slightly more money (0.42 euros) for poverty reduction than animal protection. Interestingly, participants allocated the same amount of money to the first charity (whether for humans or animals), but their second allocation depended on the charity and indicated an anthropocentric bias (i.e., higher allocations to poverty reduction than animal protection). Women donated more for animal protection than men, and stronger pro-animal attitudes were associated with higher donations for animal protection. We also found a positive effect of a "social desirability" scale on incentivized donations. In sum, our study finds that participants gave more to humanitarian than animal charities. However, this difference is less than fifty cents and, consequently, minor in magnitude.

Keywords: animal–human continuity, animal protection, dictator game, large-scale survey

Questions about differences between humans and animals are fundamental and have consequences for human self-conception. Discussion and research on this issue have a

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long tradition in various scientific disciplines such as philosophy, sociology, psychology, and ethology (DeGrazia, 2002, for a short overview). While these discussions are mainly carried out on a theoretical level in the humanities, it is also important to know what the general public thinks about these topics. For this purpose, researchers have developed a wide range of established survey-based measures of attitudes toward animals and behavioral intentions (Furnham, McManus, & Scott, 2003; Herzog, Betchart, & Pittman, 1991; Knight, Vrij, Cherryman, & Nunkoosing, 2004; Signal & Taylor, 2007; Templer, Salter, Dickey, Baldwin, & Veleber, 1981; Wuensch, Jenkins, & Poteat, 2002). At the same time, the divergence between attitudes, intentions, and actual behavior is one of the major issues in (survey-based) social research, including research on anthropocentric and ecocentric behavior (e.g., Kollmuss & Agyeman, 2000; Ouellette & Wood, 1998). Several studies (e.g., Clements, McCright, Dietz, & Marquart-Pyatt, 2015; Murphy, Allen, Stevens, & Weatherhead, 2005) show that in surveys participants tend to overstate their (hypothetical) willingness to support altruistic purposes, be it in favor of human or non-human beings. While altruism toward human beings has always been socially desirable (e.g., poverty reduction), animal protection, animal welfare, and animal rights have recently gained more and more popularity (European Union, 2015; Verbeke, 2009), which might lead to socially desirable response behavior.

We use dictator-game-like decisions, a method from experimental economics (Camerer, 2003), in order to develop a simple incentive-compatible measure of animal–human continuity in large-scale surveys. Incentive compatibility means that participants' decisions will have actual consequences, so they have no incentive to state "false" behavior and behavioral preferences. The dictator game has been widely used to measure pro-sociality and fairness concerns (Camerer, 2003; Engel, 2011). In this game, one person (the dictator) receives a certain amount of money (e.g., 10 euros) and is asked to divide this amount between another person (the recipient) and him/herself. The recipient has no influence on the distributional outcome. It is known from past research, applying the dictator game in different countries and contexts, that over 50% of the donations are between zero and half of the amount of money at stake. Hyperfair donations, of over half of the pie, are rarely observed, and around 30% of donations are generally zero (e.g., Camerer, 2003; Falk & Fischbacher, 2006).

In the present study, we combine dictator-game-like decisions with approaches proposed in environmental research by de Groot and Steg (2008) and Clements et al. (2015). De Groot and Steg (2008), albeit hypothetically, asked participants to suppose that they were willing to donate 10 euros to charity. Participants had to choose five times whether they wanted to donate 10 euros to a humanitarian or an environmental charity (see also Tisdell, Wilson, & Nantha, 2005 for a somewhat similar approach). Summing up the number of times individuals are prepared to donate to either an environmental or a humanitarian charity gives a behavioral measure of respondents' ecocentric or anthropocentric orientation. De Groot and Steg (2008) found that participants more often tend to choose a humanitarian charity.

Clements et al. (2015) used an approach with behavioral consequences similar to that adopted in the present paper. In a study based on Amazon's Mechanical Turk (MTurk; Buhrmester, Kwang, & Gosling, 2011), participants were randomly assigned to one of two groups at the end of the survey. Those in the first group were told that they would receive 0.50 dollars for completing the survey (in addition to 0.50 dollars for participating) and that they had the opportunity to donate any amount between 0 and 0.50 dollars to the World Wildlife Fund (WWF). The amounts donated were deducted from the participants' bonus amounts (i.e., actual behavior). Participants in the second group made the same decision but it was

emphasized that the donation was hypothetical. Clements et al. (2015) found a hypothetical bias: mean donations amounted to 22 cents in the hypothetical setting and 16 cents in the actual setting. This bias is also common in willingness-to-pay studies on environmental goods (Murphy et al., 2005).

In our study, based on a method from experimental economics, participants made repeated decisions as in the study by de Groot and Steg (2008), and amounts of money were paid out for decisions as in the study by Clements et al. (2015). Similar to de Groot and Steg (2008) and Clements et al. (2015), we also included several socio-demographic factors such as gender and income and attitudes toward animal–human continuity to explain differences in donation behavior. For example, studies from experimental economics (e.g., Engel, 2011) suggest that women donate more than men in experiments that measure altruistic behavior. Moreover, since women tend to express more positive attitudes toward animals than men (e.g., Herzog et al., 1991), they can also be expected to donate more for animal protection. Income should affect donations positively because, given the same preferences, higher-income households are able to spend more on human and animal purposes than lower-income households (e.g., Rajan, Pink, & Dow, 2009). Further, despite potential attitude–behavior gaps, we expected to find positive associations between relevant attitudes and donation behavior. This means those who express higher levels on an animal–human continuity scale (Templer, Conelly, Bassmann, & Hart, 2006) should also allocate more to an animal protection charity than those with lower animal–human continuity scores.

Methods

Data and Sample

The data were collected in an online survey which was carried out in cooperation with a survey organization in October and November 2015. The survey was approved as part of the LOEWE research cluster "Animals – Humans – Society" at the University of Kassel. Participants were members of the survey organization's access panel. Of 6,663 individuals who were invited to take part in the survey, 2,299 completed it; the response rate was 34.5% (taking into account 317 cases for which the quota were filled; quota criteria were gender, age, and education). Table 1 gives an overview of sample characteristics.

Experimental Design and Behavioral Measurements

We use incentivized dictator-game-like donations to measure behavior in the survey. Unlike a typical dictator game, our game does not include the division of an amount of money between two individuals but between an individual and a charity. Participants made two separate dictator-game-like donation decisions, the order of which was randomized. Respondents were aware that they had to make two decisions but not what the second decision would be about

Table 1. Overview of sample characteristics.

Variable	Mean	*SD*	Min	Max	*n*
Gender (1 = women)	0.49		0	1	2,299
Age in Years	42.39	13.34	18	69	2,299
Education in Years	11.30	3.19	7	18	2,299
Disposable Income per Month in Euros	1,961.62	869.44	190	8,944.27	1,836
Subjective Financial Situation	2.84	0.59	1	4	2,291

when faced with the first one. In one decision, they were asked to distribute 10 euros between a charity for poverty reduction and themselves, and in another decision between a charity for animal protection and themselves. We used "neutral" wording to describe the experimental task, that is, we avoided the word "donation" (yet it was clear from the context that the decision included an actual donation to a charity). We prefer neutral language because donations for a good cause might be perceived as socially desirable and, therefore, increase the amounts donated even in incentivized experiments, and we did not want to emphasize this possible experimenter demand effect (see Zizzo, 2010, for a discussion on this).

Both charities that were the recipients in the dictator-game are well established in Germany and officially declared as trustworthy for receiving donations. The daily work of the first charity mainly consists of collecting and distributing food to people in need. The second charity focuses on helping animals in danger and informing the public about this. The names of the two charities are available from the authors upon request.

The exact wording of the experimental tasks was as follows, with the one difference between the two in brackets:

> Imagine the following situation: You are given 10 euros. This amount is to be divided between yourself and the organization "XYZ" which supports poverty reduction [OR: supports protection and animal rights] in Germany. You can allocate any amount between 0 and 10 euros to the organization or keep it all yourself. It is your decision alone.
>
> Of all participants in this survey, 100 individuals will be randomly selected and their decisions will be implemented. That is, 100 individuals receive, in addition to the standard voucher for this survey, another voucher for an amount of up to 10 euros which they decided to keep for themselves and the amount they have allocated will be transferred to the relevant organization. All other participants receive only the standard voucher for this survey.
>
> First, please indicate the amount of up to 10 euros you would like to keep for yourself:
> Now indicate the amount of up to 10 euros you would like to allocate to the organization "XYZ."

We used the exact same wording in the two experimental tasks, with the only difference being the recipient of the donation.

After completion of the survey, 200 dictator-game-like decisions were randomly selected and the survey organization paid the corresponding amounts of money to the participants based on their voucher system. We also transferred the corresponding amounts to the two charities.

Measurement of Social Desirability

We used a short scale for the measurement of social desirability first introduced by Kemper, Beierlein, Bensch, Kovaleva, and Rammstedt (2012). The scale contains six items subdivided into two categories (see Table 2). While the first category (items A, C, and E) measures self-attribution of negative personal qualities, the second one (items B, D, and F) measures self-attribution of positive personal qualities. A 5-point scale ranging from "applies completely" to "doesn't apply at all" was used for the items.

Looking at the responses in Table 2, we see that the majority of respondents understate negative personal qualities (lower agreement rates for items A, C and E) and overstate positive

Table 2. Survey items used to measure social desirability.

	Applies Completely	Applies Mostly	Applies Somewhat	Applies a Bit	Doesn't Apply at All	*n*
A) It has happened that I have taken advantage of someone in the past.	4.2	7.9	25.8	38.3	23.8	2,298
B) Even if I am feeling stressed, I am always friendly and polite to others.	12.9	54.8	24.9	6.6	0.8	2,298
C) Sometimes I only help people if I expect to get something in return.	1.5	3.3	12.2	37.8	45.2	2,298
D) In an argument, I always remain objective and stick to the facts.	6.5	46.9	35.6	9.8	1.3	2,298
E) I have occasionally thrown litter away in the countryside or onto the road.	4.3	4.9	10.0	29.8	51.0	2,298
F) When talking to someone, I always listen carefully to what the other person says.	20.8	66.8	10.9	1.2	0.3	2,298

Note: all data in percent.

personal qualities (higher agreement rates with items B, D, and F). A factor analysis with subsequent varimax rotation based on all items presented in Table 2 gives a two-dimensional solution. The first factor, representing the understatement of negative personal qualities, has an eigenvalue of 1.75 and an explained variance of 0.29 and includes the items A, C, and E. The second factor, (items B, D, and F) indicating the overstatement of positive personal qualities, has an eigenvalue of 1.63 and an explained variance of 0.27. Based on these two factors, we constructed two additive scales (the sum of item scores divided by the number of items); the reliability (Cronbach's alpha) of the scales is 0.58 (negative qualities) and 0.62 (positive qualities). The scales range from 1 to 5, with mean values of 4.03 (negative qualities) and 3.76 (positive qualities). Higher values indicate a stronger understatement of negative qualities and overstatement of positive qualities, respectively.

Measurement of Relevant Attitudes

We used the animal–human continuity scale which was developed by Templer et al. (2006) to measure the degree of difference between humans and animals from the participant's point of view. In our study, most items (item A to F) were taken from this scale (see Table 3). We also included one item (G) from Herzog's Animal Attitude Scale (Herzog et al., 1991), and we developed another item (H) ourselves. All in all, the complete scale consists of eight items and a 4-point scale was used for responses to these items, ranging from "agree completely" to "completely disagree." A "don't know" option was also offered.

A factor analysis with subsequent varimax rotation of the items presented in Table 3 gives a two-dimensional solution. The first factor has an eigenvalue of 2.24 and an explained variance of 0.28 and includes all items except E and G; these two items form the second factor with an eigenvalue of 1.67 and an explained variance of 0.21. While the first factor represents perceived differences and similarities, respectively, between animals and humans, the second factor is directed toward the legitimacy of using animals for human purposes. Based on the

Table 3. Survey items used to measure animal–human continuity.

	Agree Completely	Rather Agree	Rather Not Agree	Completely Disagree	Don't Know	*n*
A) Humans can think but animals cannot. (Templer et. al., 2006)	3.8	11.2	33.4	46.4	5.2	2,297
B) People are animals. (Templer et. al., 2006)	24.8	27.9	20.0	22.1	5.2	2,297
C) Animals are afraid of death. (Templer et. al., 2006)	30.0	32.7	13.2	4.2	19.9	2,298
D) Animals can fall in love. (Templer et. al., 2006)	29.5	40.9	11.2	3.7	14.8	2,298
E) It´s okay to use animals to carry out tasks for humans. (Templer et. al., 2006)	12.0	55.7	21.3	6.5	4.5	2,297
F) It´s crazy to think of an animal as a member of your family. (Templer et. al., 2006)	7.1	14.2	32.4	44.5	1.9	2,297
G) Basically, humans have the right to use animals as we see fit. (Herzog et al., 1991)	2.2	16.5	44.5	32.6	4.1	2,297
H) Animals have the same rights as humans. (our own item)	9.5	29.0	38.6	19.2	3.7	2,298

Note: all data in percent.

two factors, we constructed two additive scales (the sum of item scores divided by the number of items), each an animal–human continuity scale (AHCS1 and AHCS2); their reliabilities (Cronbach's alpha) are 0.69 (AHCS1) and 0.53 (AHCS2). They range from 1 to 4, with mean values of 2.95 (AHCS1) and 2.67 (AHCS2). Higher values indicate a higher perceived similarity between humans and animals as well as a lower acceptance of using animals for human purposes. We would like to stress that we obtained the same substantial results in the multivariate analyses presented below when we only used the items from the scale proposed by Templer et al. (2006).

Results

Comparison of Donations to Humanitarian or Animal Charities

Figure 1 shows the proportion of donation amounts for each donation purpose separately. Participants allocated, on average, 7.26 euros to the charity for poverty reduction and 6.84 euros to the charity for animal protection. The corresponding median donations are 9 euros and 8 euros. The differences in mean and median donations amount to 0.42 euros and 1 euro, respectively. Five percent (poverty reduction) and 7% (animal protection) of participants can be described as completely selfish. They keep the full amount of 10 euros for themselves; 22 and 23%, respectively, chose a fair split of the money (5 euros for the relevant charity and 5 euros for themselves), and 49% (poverty reduction) and 45%s (animal protection) were completely hyperfair (donating the full amount to the charity).

Figure 1 also reveals that differences between the two donation purposes mainly stem from the two extremes of respondents who are "completely selfish" (10 euros for themselves) or

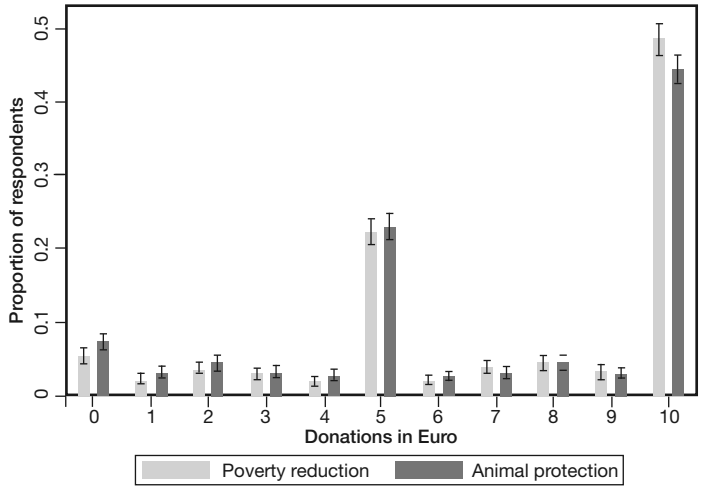

Figure 1. Proportion of respondents per donation amount, separately for humanitarian and animal charities. Spikes represent 95% confidence intervals.

"completely altruistic" (10 euros for the charities). This is confirmed by chi-square tests for each donation level comparing the proportion of those donating a specific amount by the recipient of the donation (humanitarian charity vs. animal charity). These tests show that only the differences regarding the donation levels of 0 euros ($\chi^2 = 6.87$, $p = 0.009$), 1 euro ($\chi^2 = 4.72$, $p = 0.030$) and 10 euros ($\chi^2 = 8.23$, $p = 0.004$) are statistically significant. All other differences are statistically non-significant. Please note that the following results, also regarding the multivariate analyses presented later, are robust when we exclude participants with a completely hyperfair donation of 10 euros.

Further, 65% of participants did not differentiate between the humanitarian and animal charities, and donated the same amount to both; 22% donated more for poverty reduction than animal protection and 13% *vice versa*. A clear minority in the sample is therefore truly anthropocentric.

Order Effects

In the following, we will examine whether the question order affects donation behavior. Participants were not aware what the second decision would be about when making the first dictator-game-like decision. It has to be borne in mind that 65% of participants did not differentiate between the human and animal purpose and therefore were not prone to an order effect. However, as shown in Table 4, overall and independent of the purpose, mean donations were 0.20 euros higher for the first charity than the second charity (7.15 vs. 6.95) and this difference is statistically significant ($z = -2.05$, $p = 0.040$, Wilcoxon-Mann-Whitney test). This indicates the presence of an order effect. With respect to the first charity, we did not find a statistically significant difference in mean donations for poverty reduction and animal protection (7.17 vs. 7.14, $z = -0.10$, $p = 0.922$, Wilcoxon-Mann-Whitney test). We did, however, find a significant difference of 0.79 euros for second charities (7.35 for poverty reduction vs. 6.56 for animal protection, $z = 5.64$, $p = 0.000$, Wilcoxon-Mann-Whitney test).

Further, we found statistically significant lower mean donations of 0.61 euros for animal protection compared with poverty reduction when the participants donated for poverty

Table 4. Mean donations in euros depending on question order and donation purpose.

	Poverty Reduction	Animal Protection	Total
First Charity	7.17 (3.16)	7.14 (3.31)	7.15 (3.24)
Second Charity	7.35 (3.24)	6.56 (3.44)	6.95 (3.37)
Total	7.26 (3.20)	6.84 (3.39)	7.05 (3.30)

Note: standard deviations in brackets.

reduction first (7.17 vs. 6.56, $z = 4.29$, $p = 0.001$, Wilcoxon-Mann-Whitney test). However, we did not find statistically significant differences in donations when the first donation decision was concerning animal protection (7.14 vs. 7.35, $z = 1.36$, $p = 0.1750$, Wilcoxon-Mann-Whitney test). In other words, if participants donated to a humanitarian charity first, they were prepared to donate less to an animal charity afterwards. Yet if participants donated to the animal charity first, this did not reduce the amount they were then willing to donate to the humanitarian organization. This points to a hidden anthropocentric bias and is supported by the multivariate analyses in Table 5 (Model B) which also takes into account socio-demographic variables. The interaction term between the recipient and first donations for human purposes is statistically significant and negative.

Social Desirability Effects

Our data allowed us to test whether participants' tendency toward social desirability affects donation behavior. Indeed, multivariate Model C in Table 5 shows a statistically significant effect for the tendency to understate negative personal qualities, in that those who did so were willing to donate 0.54 euros per scale point more for both animal protection and poverty reduction. No similar effect for the overstatement of positive personal qualities was observed.

Explaining Differences in Donation Behavior

Finally, our data included some plausible effects of socio-demographic and attitudinal variables which capture heterogeneity in donation behavior. First, women donated an average of 0.47 euros more for poverty reduction than men (Model A in Table 5) and, as indicated by the statistically significant and positive interaction effect in multivariate Model A in Table 5, women also donated an average of 1.30 euros more for animal protection. Second, Table 5 shows that older participants donated more than younger ones. Third, we found clear and statistically significant effects of income as an objective measure of budget constraints and the perceived personal financial situation as a measure of subjective budget constraints. The higher the disposable household income and the better the perceived financial situation, the larger the donation amounts were. Yet the income effect was extremely small in magnitude (around 0.22 euros per 1,000 euros more income) compared with the perceived financial situation (around 0.79 euros per scale point). Fourth, Model D in Table 5 shows that the effects of the AHCS1 and AHCS2 were stronger when the recipient of the donation is a charity for animal protection rather than poverty reduction. This indicates that participants with a stronger positive attitude toward animals were acting in line with their attitudes and donated comparatively more to animal protection than poverty reduction than those with a less positive attitude. The effects were substantial, which is indicated by the large effect sizes, especially for AHCS1 (see the *t*-value of 9.37 in Model D) which measures the perceived similarity between humans and animals. On the other hand, the very large negative main effect of animal protection charity in Model D

shows that those with very low scores on AHCS1 and AHCS2 donated much less for animal protection than poverty reduction.

Table 5. Results of ordinary least square regressions for dictator-game-like donations.

	Model A	Model B	Model C	Model D
Recipient				
Animal protection charity	–0.648** (–5.54)	–0.422** (–2.87)	–0.422** (–2.87)	–6.044** (–11.11)
Socio-demographics				
Gender (1 = women)	0.470** (2.64)	0.455* (2.55)	0.287 (1.60)	0.248 (1.35)
Gender x recipient	0.833** (5.15)	0.815** (5.05)	0.815** (5.05)	0.361* (2.42)
Age in years	0.018* (2.55)	0.017* (2.37)	0.007 (0.98)	0.017* (2.21)
Education in years	–0.037 (–1.24)	–0.034 (–1.14)	–0.027 (–0.91)	–0.003 (–0.10)
Income in euros/1,000	0.229* (2.14)	0.232* (2.19)	0.242* (2.34)	0.212* (2.10)
Subjective financial situation	0.789** (5.31)	0.786** (5.32)	0.755** (5.12)	0.854** (5.86)
Order Effect				
First donation to poverty reduction (FDP)		–0.291 (–1.62)	–0.315 (–1.77)	–0.310 (–1.74)
FDP x recipient		–0.435** (–2.68)	–0.435** (–2.68)	–0.452** (–2.98)
Social Desirability				
Social desirability/Positive qualities			–0.149 (–0.98)	–0.181 (–1.19)
Social desirability/Negative qualities			0.542** (4.29)	0.499** (4.01)
Attitudinal Effects				
Animal–human continuity Scale 1 (AHCS1)				–0.129 (–0.73)
Animal–human continuity Scale 2 (AHCS2)				0.266 (1.66)
Recipient x AHCS1				1.382** (9.37)
Recipient x AHCS2				0.661** (4.71)
Constant	4.015** (6.16)	4.187** (6.29)	3.068** (3.64)	2.145* (2.09)
R^2	0.06	0.07	0.08	0.13
n	1,224	1,224	1,224	1,224
(decisions)	(2,448)	(2,448)	(2,448)	(2,448)

Notes: *$p < 0.05$; **$p < 0.01$; *t*-values in brackets; all models are clustered using the Huber-White sandwich estimator and taking two decisions per respondent into account.

Discussion and Conclusions

In our study, participants made two decisions and could give money for poverty reduction and animal protection. Our findings provided several main insights. First, we observed a high share of hyperfair donations. This is in stark contrast to the typical donation behavior seen in dictator-game experiments conducted with anonymous participants (Camerer, 2003). We also observed higher donations as reported in Clements et al. (2015). Mean donations were well above a fair 5-euro split of the total 10 euros available. This applies to both the humanitarian and animal charities. Second, mean donations were higher for poverty reduction than for animal protection. But the difference amounts to only 0.42 euro, on average. Coming back to the question in the title of this paper, we find that participants give more to humans than to animals in need but by a very small margin (somewhat similar to Tisdell et al., 2005). Third, there is evidence of an order effect. If participants donated for poverty reduction first, they donated significantly less (0.61 euros, on average) for animal protection. However, this difference in donation behavior is not observed if participants first donated for animal protection (which received 0.21 euros less, on average, than poverty reduction). Fourth, we found a positive effect of a social desirability scale on mean donations. Fifth, our data contained plausible effects explaining differences in donation behavior. For example, in line with other studies using the dictator game in experimental economics (e.g., Engel, 2011) as well as studies on attitudes toward animals (e.g., Herzog et al., 1991), women donated higher amounts for animal protection (and poverty reduction) than men. Those who perceive animals as being similar to humans (higher scores on the animal–human continuity scale) donate significantly more if the recipient is an animal charity rather than a poverty reduction charity.

Most dictator-game studies find virtually no hyperfair offers (Camerer, 2003). A simple explanation for the difference between the other studies and the present one is that in the other studies recipients are individuals whereas here the recipient is a charity for a good cause. Clements et al. (2015) also find a substantial, albeit much lower, share of hyperfair donation behavior in their study based on donations to the WWF. In Germany, large sections of the general public donate substantial amounts of money to various charities annually (DZI, 2014). Against this background, the donations in our study seem to be plausible. On the other hand, we provided participants with two amounts of 10 euros that they could allocate. Such an approach might be prone to a windfall or house money effect which is well documented in behavioral economics (e.g., Ackert, Charupat, Church, & Deaves, 2006; Harrison, 2007). If such an effect is present, participants have a tendency to state higher amounts of money than they would give out of their own pocket.

Further, although we conducted an online survey which is perceived as more anonymous by participants and less likely to lead to socially desirable responses (Kreuter, Presser, & Tourangeau, 2008), participants are still aware that they are part of a scientific study and experimenter demand effects cannot be ruled out (Zizzo, 2010). In addition, we placed the behavioral measure at the end of the survey. By this point, participants had already answered many questions dealing with animals and animal rights protection. Again, this might have led to higher donation amounts and a higher share of participants who did not distinguish between making donations to benefit humans or animals. We did not observe a universal “experimenter demand effect” indicated by the order effect—lower donations for animals if the first question was directed toward humans. This demonstrates a “hidden” preference for humans over animals which cannot be detected if respondents first donate

for a cause related to animals rather than humans. Future research might benefit from studies comparing behavior in field experiments and survey-based responses, examining the windfall effects and comparing responses when the behavioral measure is placed at the beginning or end of the survey. Furthermore, several human rights and animal charities could be included in the behavioral measure in order to find out whether the choice of charity affects the results.

Providing incentivized behavioral choices might suggest that socially desirable responses might not be observed at all when compared with hypothetical behavioral choices. This could be a misperception. There are studies using experimental methods that also confirm the presence of social desirability effects when a real exchange between money and goods is involved (Norwood & Lusk, 2011). On the other hand, respondents scoring high on a social desirability scale might be prepared to pay a price in order to behave in a socially desirable manner. This means that they would not really value the human or animal purpose at hand but the fact that positive donations are a socially desirable behavioral choice which is rewarded positively by other members of society. In other words, these individuals place a value on acting in line with perceived socially appropriate behavior. Future studies might attempt to separate these different motives: concerns for other (non-)human beings and and/or concerns for socially desirable behavior itself.

We did not pay all participants in the present study and this might be seen as a limitation because the participants might have taken the behavioral task less seriously as a result. Given a stake size of 10 euros, our research budget did not stretch to paying all participants, unfortunately. On the other hand, this stake size is much higher than in other studies conducted on MTurk, for instance (e.g., Buhrmester et al., 2011; Clements et al., 2015). This should increase incentive compatibility. It is also common to pay a randomly selected number of behavioral decisions in experimental studies and not all decisions per participant. Nonetheless, there is a need for survey-based studies that compare the results of paying a random selection of participants with paying all participants. This paper is intended to be a contribution to the growing body of literature that is concerned with measuring behavior in surveys, and we hope that our study paves the way for research in this area related to the human–animal nexus in the future.

Finally, there might be other approaches to measuring real behavior in large-scale surveys so as to overcome or reduce socially desirable responses and the attitude-behavior gap. By considering and comparing donation behavior toward two charities, we believe that our method is better able to capture the *difference* individuals make between humanitarian and animal charities, and quantifying this difference provides valuable additional information on the animal–human continuity. It might be surprising that in our study participants only favored human purposes over animal purposes by a very small margin. Future studies should show whether this finding can be replicated.

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Conflicts of Interest

The authors state there are no conflicts of interest.

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Children's Attitudes toward Cats on St. Kitts, West Indies

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ABSTRACT Little is known of the attitudes of Caribbean people toward free-roaming and pet cats, so we conducted a questionnaire survey of primary-school children aged 5 to 13 years (n = 417, 206 girls and 209 boys, while two questionnaires did not indicate gender) in 23 schools around St. Kitts. Over 50% reported they owned or had owned a cat, and ownership was associated with feelings of happiness and comfort. Children reported 511 reasons for liking cats compared with 433 reasons for disliking them. They liked cats mainly for behavioral reasons (58%), such as cats being playful and providing companionship, and aesthetic reasons (47%), such as cats being colorful and beautiful. Children only infrequently reported liking cats for practical reasons (14%), such as removing vermin. Eighty-four percent of cat owners reported purchasing special food for their cats, and 96% provided water. Over 60% of non-cat owners provided water for free-roaming cats. Most school children (43%) thought there were too many cats on St. Kitts, while only 28% thought this was not the case. The children principally owned cats because they loved animals (43%) and cats controlled vermin (28%). Seventy-two percent of children thought there were too many rodents on St. Kitts. Most children (61%) were aware that cats were associated with human diseases but were principally afraid of cats because of the possibility of being bitten or scratched (54%). In summary, our study shows that primary-school children on St. Kitts mostly have positive attitudes toward free-roaming cats and are concerned for cats' wellbeing. Although important in their own right, children's attitudes often reflect those of their families and so our findings could facilitate decision-making on cat welfare issues in the region.

Keywords: animal welfare, attitudes, children, free-roaming cats, population management, public health

Following their domestication around 9,000 years ago in the Near East (Driscoll, Macdonald, & O'Brien, 2009) cats, *Felis catus*, have become common companion animals worldwide. Initially cats probably came into contact with people when they were

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attracted to the large numbers of rats and mice found in early granaries. Humans likely tolerated the cats (Driscoll et al., 2009), and vice versa, with some cats eventually being welcomed into homes and provided with additional food and protection. Unlike dogs, however, cats only became semi-domesticated, as evidenced by their modest genetic diversion from wildcats and relatively few genomic regions with strong signals of selection (Montague et al., 2014). While people have controlled the breeding of dogs over the millennia and selected for traits of domestication such as ability to socialize with people and personality, this has not been the case with cats. Controlled breeding has been relatively insignificant in cats, with less selection pressure for socialization with people, making cats less dependent, more aloof, and maintaining their ability to fend for themselves.

Cats have never become "man's best friend" and the human–cat bond has been an uneasy one, with cats almost becoming extinct in Europe in the middle-ages, as they were associated with witchcraft and the Black Death (Luff & García, 1995). In 1484, Pope Innocent excommunicated all cats and the Inquisition attempted to burn all cats and cat lovers, which might have led to an increase in the number of rats and facilitated the spread of bubonic plague.[1] Similarly, cats in South Korea are often not accepted as pets and are commonly linked with sorcery (Podberscek, 2009). On the other hand, cats were worshipped in Ancient Egypt (Kurushima et al., 2012) and are a revered animal in Islam (Glassé & Glassé, 2001). Similarly, cats in Westernized countries are often considered favored pets, although abuse and neglect occurs (Toukhsati, Bennett, & Coleman, 2007).

Although cats can be companion animals and rely on people for food and shelter, they can also remain on the periphery as free-roaming cats which are self-sufficient hunters and scavengers. In the US, for example, there are almost equal numbers of owned and free-roaming cats (Levy, Gale, & Gale, 2003). While owned cats are anticipated to generally have a better quality of life, free-roaming cats suffer higher morbidity and mortality and raise welfare, environmental, health, and social issues in the communities in which they co-exist (Levy, Woods, Turick, & Etheridge, 2003). Because of these issues, various methods have been developed to control free-roaming cat populations such as cat sanctuaries, colony maintenance, culling, and relocation and trap-neuter-return programs (Loyd & Hernandez, 2012; Robertson, 2008; Zasloff & Hart, 1998). Which method is best used in an area depends to a large extent on the cultural beliefs and attitudes of the people in the community who interact with the free-roaming cats (Gramza, Teel, VandeWoude, & Crooks, 2016; Jackman & Rowan, 2007).

Cats were probably first introduced onto the Caribbean islands by the early European settlers in the 15th century, who brought them on their sailing ships to control rats (Borroto-Páez, Woods, & Sergile, 2012). Subsequently, they became established on the islands and, as an invasive species, caused an estimated 38% biodiversity loss as a result of the extinction and decline of several reptile, amphibian, bird, and mammal populations (Borroto-Páez et al., 2012; Medina et al., 2011). Although population control policies are being considered, for these to be successful they need to be consistent with the views and attitudes that local Caribbean people have toward cats (Alie, Davis, Fielding, & Maldonado, 2007; Borroto-Páez et al., 2012; Medina et al., 2011).

There is, however, very limited information on cat ownership and attitudes to cats in the Caribbean region (Alie et al., 2007; Fielding, 2009). A study in the Bahamas showed that cats are primarily owned by women and that cat owners report strong attachment to their pets, although only a small percentage of the animals are confined to the house or are neutered

(Fielding, 2009). A study on cat ownership and attitudes toward free-roaming cats on St. Kitts conducted only among adults attending a Saturday morning market in the capital (Moura, Miller, Thurk, Kelly, & Krecek, 2007) revealed free-roaming cats were generally viewed positively, in particular because they controlled mice and rats. Participants were concerned about the number of free-roaming cats as it might raise animal welfare issues amongst tourists and were amenable to a neutering program to control numbers (Moura et al., 2007).

To obtain more complete data on the attitudes to cats on St. Kitts, we surveyed primary-school children from around the island. We regularly interact with schoolchildren from around St Kitts as part of an ongoing study in which we use them to count free-roaming cats. As children and their families often have similar attitudes (Glass, Bengtson, & Dunham, 1986; Maccoby, 1992), we considered our approach a convenient way to gather data on not only children's attitudes to cats, but also those of the broader society.

Methods

St. Kitts was discovered by the Spanish, and until emancipation in 1834, the island survived a long chapter of colonization and plantation slavery by British and French settlers and slaves who originated from various West African groups (Richardson, 1983). St. Kitts is one of the Leeward Islands in the Caribbean region with a population of 35,217 people (CARICOM Capacity Development Programme, 2000). There are nine administrative areas called parishes, with primary-school children usually attending the school within the parish where they reside.

With approval from the Ministry of Education, school principals, and the Institutional Review Board of Ross University School of Veterinary Medicine, we surveyed classes in third to fifth grade between September and December 2015. Our standardized questionnaire addressed attitudes and care practices toward cats. Paper questionnaires were completed individually, although help was provided with reading questions and children were encouraged to seek clarification on questions as needed. The questionnaire[2] included 24 questions that were arranged in seven themes: (1) reason(s) for liking and disliking cats (e.g., What do you like about cat(s)?), (2) demographic information such as age, gender, and parish (e.g., How old are you?), (3) cat ownership and reasons for ownership (e.g., What is the most important reason for having or wanting a cat(s)?), (4) care practices surrounding access to food and water for cats (e.g., Who in the family is responsible for feeding the cat(s) at home or around the yard?), (5) cat diseases and concerns about zoonoses (e.g., Would you be concerned that you would get sick from a cat(s)?), (6) attitudes toward cats (e.g., The cat(s) make(s) me feel happy), and (7) view on the link between cat and rodent populations (e.g., Would you say that there are too many rats and mice in your community?).

The questionnaire included a variety of response options such as (1) 5-point Likert scales (never, rarely, sometimes, often, always) and (2) binary (yes, no) questions that addressed attitudes and ownership, as well as (3) two open-ended questions that identified students' views for liking or disliking cats. The principal investigator (EA) and co-author (AC) worked together to code the responses to liking or disliking cats along four binary variables: (1) aesthetic; for example, beautiful versus scary (2) behavioral; for example, playful versus unpredictable, (3) practical reasons; for example, removal of vermin versus fear of biting and scratching, and (4) other reasons, such as having kittens versus defecating and urinating in the house. Additionally, for inferential statistics purposes, the 5-point Likert-scale questions were recoded as binary responses (0: never/rarely, 1: sometimes/often/always). With these recoded variables, Fisher's exact test was used to compare gender differences and cat ownership, and Student's

Table 1. Categorized reasons for liking or disliking cats based on gender and ownership status.

		All (n = 417)	Boys (n = 209)	Girls (n = 206)	p	Non-owner (n = 181)	Owner (n = 234)	p (Fisher exact test)
Reasons for Liking Cats	Aesthetic	198 (47%)	83 (40%)	115 (56%)	0.001	77 (43%)	120 (51%)	0.09
	Behavioral	243 (58%)	112 (54%)	130 (63%)	0.06	88 (49%)	154 (66%)	0.0005
	Removal of vermin	58 (14%)	29 (14%)	29 (14%)	1.00	20 (11%)	38 (16%)	0.20
	Others	55 (13%)	26 (12%)	28 (14%)	0.80	14 (8%)	41 (18%)	0.003
Reasons for Disliking Cats	Aesthetic	22 (5%)	11 (5%)	11 (5%)	1.00	13 (7%)	9 (4%)	0.20
	Behavioral	30 (7%)	12 (6%)	18 (9%)	0.30	21 (12%)	9 (4%)	0.004
	Fear of biting and scratching	225 (54%)	114 (55%)	111 (54%)	0.90	100 (55%)	125 (53%)	0.80
	Other reasons	121 (29%)	54 (26%)	66 (32%)	0.20	40 (22%)	79 (34%)	0.01

t-test was applied for comparison of age distributions. All questionnaire responses were entered into a spreadsheet using Microsoft Excel® software, and analyses were performed with R software (R Core Team, 2004).

Results

Four hundred and twenty-two questionnaires were completed and collected. Five questionnaires were excluded from the analyses as the age of the participant was not indicated. The remaining 417 questionnaires were filled out completely or partially by primary-school children aged 5 to 13 years (median 9 years; 3 under 7 years): 206 girls (49.4%) and 209 boys (50.1%), while two questionnaires did not indicate gender; across 23 primary schools around St Kitts. On average, 18 questionnaires were completed at each school (range: 5–36).

The majority of children surveyed (two children did not respond to this question) owned or had owned a cat (sometimes to always: 234/415, 56%) with no significant differences based on gender (p = 0.9) or age (p = 0.3, df = 348). The most common reasons for owning or wanting to own cats were a love of animals (43%) and to control vermin (29%). Children also reported wanting a cat for companionship (29%), and for wanting to provide care for an animal (12%) as well as for wanting to become a veterinarian (< 0.1%).

Overall, children reported 511 reasons for liking cats compared with 433 reasons for disliking cats. The main reasons for liking cats (Table 1) were: behavioral (58%), such as cats being playful, kind, clean, and fast; and aesthetic (47%), such as cats being beautiful or colorful or having nice eyes. Less important were removing vermin (14%), and other reasons (13%) such as cats having nine lives and being survivors, or being small in size or having kittens. Children disliked cats mostly because they were afraid of being bitten or scratched (54%) but also for behavioral and a variety of other reasons such as being scary and unpredictable, dirtying the yard, scratching furniture, and carrying diseases.

Table 2. Children's attitudes toward cats on St Kitts.

	Never	Rarely	Sometimes	Often	Always	Missing Values	Sometimes to Always		*p* (Fisher exact test)
							Non-owner	Owner	
I am afraid of cats	66%	2%	22%	2%	8%	4	34%	30%	0.5
The cats make me feel happy	19%	3%	24%	4%	50%	6	63%	90%	< 0.0001
I get comfort from touching the cats	25%	2%	19 %	7%	46%	4	54%	87%	< 0.0001
I am gentle when I interact with cats	21%	4%	21%	6%	48%	12	66%	83%	< 0.0001
I feel sad when I see a cat suffering	13%	3%	12%	3%	68%	2	77%	89%	0.002

In general, differences in attitudes to cats did not change with age although older children were more likely to report that cats made them happy ($p = 0.05$, $df = 123$) and to like cats for practical reasons; remove vermin ($p = 0.02$, $df = 75$) (data not shown). Significantly more girls were afraid of cats (40%) than boys (25%) ($p = 0.001$), and more girls reported they were sad to see a cat suffering (90% versus 77% of boys) ($p = 0.0006$).

Children's attitudes toward cats are shown in Table 2. There were significant differences in attitudes between cat owners and non-cat owners. Children who owned a cat were significantly more likely to answer that they were gentle with cats ($p < 0.0001$), that cats made them feel happy and comforted ($p < 0.0001$), and that they would feel sad if they saw a cat suffer ($p = 0.002$).

With respect to maintenance of cats, many of the children reported they were generally responsible for feeding their cats (53%) and were more likely than their parents to notice if one was sick (43% versus 30%). Most of the children who owned cats reported that special food was purchased for the animals (84%) and almost all (96%) provided water, mainly tap water (66%) but also bottled (28%) and rain water (6%) more than once a day (68%). A high percentage of children bought food for cats (68%) and/or gave water (82%) to free-roaming cats. Compared with children who did not own cats, those who did own cats were more likely to buy food (84% vs 43%, $p < 0.001$) and/or give water (96% vs 62%, $p < 0.001$) to free-roaming cats.

Many children answered they were concerned about getting sick because of cats (61%), with significantly more cat owners being concerned than non-cat owners (68% versus 56%, $p = 0.02$). However, only 47% of concerned children were able to correctly name a specific

cat-associated disease: rabies (82 answers), allergies (14 answers), and external parasites (16). Interestingly, a higher percentage of non-cat owners (53%) than cat owners (41%) ($p = 0.06$) were able to correctly name a cat-associated disease, although this difference was not statistically significant.

In questions relating to the numbers of cats on St Kitts, the majority of children (43%) indicated there were too many, with 28% being undecided and 28% thinking there were not too many. The majority of children (73%) thought there were too many rodents on St Kitts, with only 16% reporting this was not the case.

Discussion

Our study is the first to assess cat ownership and attitudes of primary-school children in the Caribbean toward free-roaming and pet cats. Overall, over half the children were found to own or have owned cats, which is in contrast to the findings of a survey of adults in 2007 (Moura et al., 2007), where only 12% of adults reported owning a cat. Although some of the children we surveyed might have been from the same family and hence the number of cats might be overstated, it would appear that the owned pet-cat population on St. Kitts is increasing, a trend that is observed across many countries in the world (Hall et al., 2016). Increased animal ownership may additionally benefit the community as it has been associated with the enhancement of children's development with respect to responsibility, respect and compassion, as well as improved health and social skills (Friedmann & Son, 2009; Hall et al., 2016; Poresky, 1996).

The increasing cat ownership on St. Kitts is not surprising as both the adults surveyed previously (54%) (Moura et al., 2007) and the children we studied reported liking cats more than disliking them, for various reasons. A positive attitude toward cats appears to be widespread in the Caribbean, with positive attitudes predominating in Dominica and accounting for cats being one of the four most commonly seen animals in the capital, Rosseau (Alie et al., 2007). The reasons for both adults (Moura et al., 2007) and the children we studied from St. Kitts liking cats were similar in that both reported that they liked cats because they controlled vermin. Other reasons, however, differed according to age, with adults mainly reporting they liked cats because they provided companionship (Moura et al., 2007) whereas the children we surveyed mostly liked cats because of their behavior and appearance. This is consistent with young children having high levels of egocentricity and enjoying pets for their aesthetic value (Kidd & Kidd, 1985, 1989; Poresky, Hendrix, Mosier, & Samuelson, 1988).

Although the children we surveyed mostly had a positive view of cats, and reported feeling happy and comforted by cats, this was tempered with caution and the main reason they disliked cats was because of the fear of being scratched and bitten (54%). Previously surveyed adults (Moura et al., 2007) mainly disliked cats because they fouled the environment and damaged furniture, which is also the case for adults from other cultures including Japanese (Feldmann & Carding, 1973; Slater et al., 2008; Uetake, Yamada, Yano, & Tanaka, 2014). Why the children we surveyed did not adopt their parent's reasons for disliking cats is unclear, though the children's reported fears might be linked to parents warning their children of risks and dangers associated with animals (Dixon, Mahabee-Gittens, & Lindsell, 2010). While people surveyed in Australia, New Zealand, the United Kingdom, the United States, China, and Japan were often concerned about the negative impact that cats have on wildlife (Hall et al., 2016), the children we surveyed from St. Kitts did not express such concern. This most likely reflects a lack of knowledge surrounding endemic biodiversity, risks, and conservation issues and the need to develop appropriate educational programs for the Caribbean, particularly on islands promoting ecotourism.

A relatively large number of the children we surveyed (43%) thought there were too many cats on St Kitts, which is higher than in the study performed eight years previously, where 27% of adult Kittitians thought there was an overpopulation (Moura et al., 2007). Although this might reflect the different populations surveyed, it could also indicate rising cat numbers on the island in the eight years between the studies. Our finding that 60% of children often provide food and water to free-roaming cats, which might improve their survival and increase this sector of the cat population (Toukhsati et al., 2007). Cat numbers on islands where tourism is important is of particular concern as large numbers of animals in poor condition might have a negative impact on tourism (Alie et al., 2007). In the 2007 St. Kitts study, 50% of the people surveyed thought that population control was needed (Moura et al., 2007), but this question was not raised with the children we surveyed as it was considered too advanced.

Our current finding—that relatively high numbers of children considered there were too many cats on St Kitts—might represent the opinions of the general public, as children often reflect the opinions of their families and vice versa (Glass et al., 1986; Maccoby, 1992). Therefore, it would seem that intervention strategies to control cat population numbers might now have even higher support than the 50% reported in 2007 (Moura et al., 2007). Socio-demographics are a strong predictor for the success of animal population programs (Levy et al., 2003) and the positive perception the children had of cats means any intervention strategies must be considered carefully from an animal welfare standpoint. We did not question children on the relative merits of the different possible management control strategies as this was regarded as too advanced a topic. In the previous study on St Kitts, however, the question was raised with most people not supporting culling but being in favor of the creation of more cat shelters (Moura et al., 2007). Currently, there are only very limited animal population management programs in the Caribbean (Borroto-Páez et al., 2012) and studies are needed to more precisely identify local attitudes and beliefs that would influence the expansion of existing programs and the development of more appropriate programs.

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Conflicts of Interest

The authors declare that they have no competing interests.

Notes

1. The Devil in Disguise: The Cat in the West http://the-toast.net/2014/05/12/devil-disguise-cat-west/
2. The full questionnaire is available from the corresponding author upon request.

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Using Attachment Theory and Social Support Theory to Examine and Measure Pets as Sources of Social Support and Attachment Figures

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ABSTRACT Companion animals are increasingly being recognized by society as beneficial to our health and considered by many owners as authentic and affectional family members. Human relationship theories help us to understand the emotional and supportive aspect of the human–companion animal bond. This study uses attachment theory, social support theory, and the concept of the hierarchical nature of attachment relationships to further understand and measure human–animal attachment. In study 1,161 university-student pet owners completed a modified multidimensional scale of perceived social support (MSPSS) that included pets as a source of support, and we pre-tested a 60-item pet attachment measure. Results showed that students perceived their pets as distinctive sources of social support, at similar levels to their significant others, family, and friends. Principal components analysis of the 60-item measure reduced it to 31 items, and revealed four pet attachment components: (a) Proximity maintenance and interaction, (b) Emotional attachment behaviors, (c) Emotional support given and received, and (d) Emotional and monetary value. The scale was named the Emotional and Supportive Attachment to Companion Animals Scale (ESACA) (Cronbach's α = 0.96). In study 2, 83 university students completed an attachment hierarchy scale and the ESACA. Companion animals were included in pet owners' attachment hierarchies and ranked higher than siblings but lower than romantic partners, parents, and close friends. Those who indicated higher attachment to their companion animals ranked them higher in their attachment hierarchy than those less attached. This study supports and extends previous research that has used aspects of attachment theory and social support theory when exploring the human–animal bond. Many companion animal owners perceive their

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pets as additional sources of emotional support, fulfilling the four features of an attachment relationship and including them in their hierarchy of important attachment relationships.

Keywords: attachment hierarchy, attachment theory, companion animal attachment, emotional social support, human–animal bond

Companion animals provide owners with companionship, unconditional love, support, and physical and mental health benefits (Krause-Parello, 2012; Peacock, Chur-Hansen, & Winefield, 2012). They can act as social facilitators, enabling people to establish friendships, increase prosocial learning behaviors, and reduce anxiety in children and adults (Barker, Knisely, Schubert, Green, & Ameringer, 2015; Beetz, Julius, Turner, & Kotrschal, 2012; Pachana, Massavelli, & Robleda-Gomez, 2011; Wood et al., 2015). Owners' grief reactions after their pets die are similar in intensity to grief after the death of a close human, suggesting that the human–companion animal bond is an authentic and meaningful emotional relationship (Archer & Winchester, 1994; Carmack & Packman, 2011; Tzivian & Friger, 2014). While there is a growing body of evidence-based research reporting the benefits of human–animal relationships (Fine, 2010; Julius, Beetz, Kotrschal, Turner, & Uvnas-Moberg, 2013), some researchers report inconsistent findings (Chur-Hansen, 2010; Crawford, Worsham, & Swinehart, 2006; Maujean, Pepping, & Kendall, 2015; Peacock et al., 2012) and advise future researchers to use appropriate theory and psychometrically sound measures when determining the benefits of human–animal interactions. In this study, we use two interpersonal human relationship theories to better understand and measure the complex emotional nature of the human–animal relationship.

Attachment theory and social support theory are human relationship theories commonly used when exploring human–companion animal relationships and the socio-emotional benefits of human–animal interactions (Antonacopoulos & Pychyl, 2010; Archer & Ireland, 2011; Beck & Madresh, 2008; Beetz et al., 2012; Zilcha-Mano, Mikulincer, & Shaver, 2011). Human–companion animal bond researchers mainly use subjective questionnaires and interviews when exploring owners' attachments to their companion animals (Anderson, 2007; Wilson & Netting, 2012; Winefield, Black, & Chur-Hansen, 2008). Indicators of human–animal attachment have also been measured using objective methods such as recording observational behavioral patterns and physiological parameters such as blood pressure, oxytocin, and cortisol (Beetz et al., 2011; Julius et al., 2013; Odendaal & Meintjes, 2003). In the current study, we used self-report questionnaires as these are useful for investigating participants' thoughts and perceptions, and are convenient and practical.

There are many published measures of the human–companion animal bond (Anderson, 2007), suggesting that the construct is complex and can be defined in different ways. A recent study investigated instrument development in the human–animal interaction field and reported that few had used theory in item development when operationally defining human–animal attachment, and concluded underlying psychometric properties such as internal reliability and construct validity were questionable in many studies (Wilson & Netting, 2012). In this study, we used attachment theory, attachment hierarchies, and social support theory as theoretical foundations to contribute to our understanding of the human–companion animal bond. We acknowledge that research on human–animal attachment has already been published using theories such as attachment theory and social support theory, and believe our research builds on these studies.

Attachment Theory and Companion Animals

Attachment theory helps explain the socio-emotional and behavioral features of the human–companion animal bond. John Bowlby proposed that when we are born we develop a strong emotional connection with a primary attachment figure (AF) (e.g., our mother or primary caregiver) and that the display of certain behaviors indicates attachment (Bowlby, 1969, 1973, 1980). Mary Ainsworth also extensively researched attachment behaviors of infants and children toward their caregiver or AF (Ainsworth, 1991; Ainsworth, Bell, & Stayton, 1971; Ainsworth, Blehar, Waters, & Wall, 1978), and argued that children develop attachment relationships with other companions as they enter adulthood. Bowlby and Ainsworth proposed that children also display behaviors when interacting with caregivers to ensure caregiving and protection. Children develop mental attachment representations when interacting with their caregiver and these types of attachment can be either secure or insecure (ambivalent or avoidant). Ainsworth found that most children are securely attached and display four attachment behaviors: (a) proximity seeking and maintenance (PM)—where the AF's nearness and accessibility is prioritized; (b) separation distress (SD)—whereby distress is experienced when the AF is not present; (c) safe haven (SH)—where the AF is used as a source of emotional support and comfort when the environment is perceived as threatening; (d) secure base (SB)—where the AF is perceived as a dependable source of support allowing exploring of the environment. Ainsworth also suggested that a child's type of attachment (i.e., secure vs. insecure) informs the way they evaluate themselves as being worthy of respect and how they perceive other people as being responsive to them. These perceptions reflect the internal working models or representations of a person's type of attachment to others. Importantly, these representations can be transferred to other close relationships that may develop during that person's life (Bowlby, 1980). Pet attachment researchers argue that relationships with companion animals are regarded by many owners as emotionally close as human attachment. Therefore, attachment theory could be used to describe human–animal attachment. While previous research on pet attachment explored secure and insecure attachment styles (Beetz et al., 2012; Smolkovic, Fajfar, & Mlinaric, 2012; Zilcha-Mano et al., 2011), in this study we specifically focused on the four attachment behaviors of a secure attachment (i.e., PM, SD, SH, SB).

Owners often report that they preferentially interact with their companion animals over other close relationships (Kurdek, 2008; Sable, 1995) and express grief and distress (Gosse & Barnes, 1994; Tzivian & Friger, 2014) when their pet dies. These behaviors suggest that adult owners display attachment behaviors such as proximity seeking and maintenance and separation distress toward their companion animal. In addition, research suggests that they also regard their companion animals as always being there for them if they need them and seek emotional comfort from them when they are upset, suggesting the features safe base and safe haven exist (Archer & Ireland, 2011; Margolies, 1999). While many of these studies do not necessarily evaluate attachment typology (i.e., secure or insecure), overall, these findings suggest that companion animal owners experience thoughts and display behaviors that reflect secure attachment toward their pet and that their pet is a potential attachment relationship.

Attachment Hierarchy and Companion Animals

An attachment hierarchy is a collection of relationships that an individual orients toward using the four features of attachment described above (Trinke & Bartholomew, 1997). A person's attachment hierarchy reflects a framework for understanding multiple attachment bonds with others such as siblings, romantic partners, friends, and companion animals (Ainsworth, 1989;

Hazan & Zeifman, 1999; Trinke & Bartholomew, 1997). Within a person's hierarchy there is preference for a primary attachment figure, and most people form other attachment relationships and include them in their hierarchy as they transition through the life cycle (Ainsworth, 1989; Bowlby, 1969). Hazan and Zeifman (1994) created the WHOTO to measure the transfer of primary attachments and functions from parents to peers. They found that peers mainly provide proximity seeking and safe haven functions, and parents and partners provide separation distress and secure base functions. Hazan's study provides a useful framework for identifying attachment relationships across the lifespan and can be used to determine whether companion animals fulfill attachment functions.

Evidence about pet owners perceiving their companion animals as potential attachment figures is found in recent research by Kurdeck (2008, 2009). He compared young adults' rankings of their pets as safe havens when experiencing distress. While young adults ranked their pets as safe haven figures less than their mothers, friends, and partners, they ranked them higher than their fathers and brothers (there was no difference in ranking with sisters) (Kurdek, 2008, 2009). While the main aim of Kurdeck's study was to explore companion animal owners' preferences for whom they seek out for safe haven, an obvious extension of this research is to determine whether companion animals are considered a primary AF in a person's hierarchy of attachment relationships for all four attachment behaviors.

Companion Animals and Social Support

Adults and children often identify their pet as a member of their social network, providing them with emotional support to cope with family life changes and stress (Albert & Bulcroft, 1988; Melson, 2003; Staats, Wallace, & Anderson, 2008; Stammbach & Turner, 1999). Companion animals may also provide a special type of social support that is unconditional and nonjudgmental (Pachana et al., 2011). Where individuals feel that they cannot talk to another person for fear of being judged, companion animals are a safe option (Hafen, Rush, Reisbig, & McDaniel, 2007). Cats are perceived as an additional source of emotional support for strongly attached pet owners (Stammbach & Turner, 1999). Some studies have found no correlation between social support and pet attachment, concluding that researchers should clearly define what aspect of social support they are measuring (Winefield et al., 2008). Emotional support is usually provided by a close relationship or a supportive attachment relationship (Tardy, 1985). Therefore, measuring a companion animal owner's perception of their pet as a source of emotional social support informs us, to some degree, about the strength and quality of the human–animal relationship.

One scale that measures the perception of received and available social support from sources of support (e.g., friends, family, and significant others) is the MSPSS (Zimet, Dahlem, Zimet, & Farley, 1988). This scale is useful because it measures the adequacy of emotional and instrumental social support from different sources, so they can be considered independently. One study that used the MSPSS found that highly attached pet owners perceiving low levels of human social support were more lonely and depressed than those who did not own pets (Antonacopoulos & Pychyl, 2010). Another study which also used the MSPSS reported a positive correlation between perception of social support from family and closest friends and pet attachment (Smolkovic et al., 2012). However, they did not include pets as a potential source of social support in their measure. More recently, a study explored pet presence and indicators of psychological wellbeing and mood in older Australians (Bennett, Trigg, Godber, & Brown, 2015). They included pets in an adapted social support scale and found greater psychological

wellbeing in adults when a pet was present. However, there was no association with social support and pet presence. An extension of the above research to help identify and clarify the type of support pets provide is to include pets as a potential source of support in a validated multidimensional social support measure such as the MSPSS and validate it. Zimet et al. (1988) identifies family, friends, and significant others in their measure and commented that other meaningful relationships could also be perceived as emotionally supportive. In this study, we used the MSPSS and added items to the scale to allow companion animals to be included as meaningful and distinctive sources of emotional and instrumental social support.

The Current Study

The main goal of this research was to use concepts from attachment theory (such as the four secure attachment behaviors and attachment hierarchy) and social support theory to contribute to our understanding of the human–companion animal bond. Our objectives were: to determine whether companion animals are perceived as a distinctive source of social support; to determine whether owners identify pets in their attachment relationship hierarchy and perceive their pets as fulfilling all four features of secure attachment. We also developed a self-report measure of companion animal attachment to assist in achieving the above objectives.

In study 1, owners' perceptions of their companion animals as sources of support was measured and a companion animal attachment scale was developed. Study 2 explored whether owners included pets in their attachment hierarchy of relationships and whether they fulfilled all four attachment functions. We also further validated the companion animal attachment scale. For the purpose of this paper, companion animal attachment is defined as "a selective and prioritized enduring close affectional bond that is perceived as providing emotional support and companionship," and a companion animal refers to a dog or cat that lives within a household. Companion animal and pet are used interchangeably for ease of reading.

Methods

Participants

Convenience samples of university students were recruited on two separate occasions. All owned at least one companion animal.

Study 1: Participants were 161 companion animal owners (47 males, 114 females), ranging in age from 18 to 37 years (M = 20.9; SD = 3.5). The majority were Australian (82%; n = 122), with the remainder of European or Asian descent. Most lived in households with others, ranging from two to 10 occupants (M = 3.8, SD = 0.11); only six respondents lived alone. Just over half (51%; n = 82) owned two companion animals (range 1 to 10), the remainder (49%; n = 79) owned a single companion animal.

Study 2: Participants were 83 companion animal owners (23 males, 60 females), ranging in age from 17 to 45 years (M = 21.5, SD = 5.9). The majority were Australian 74% (n = 62), with the remainder of European or Asian descent. Nine participants lived alone, while most (89%; n = 74) lived in households with others, ranging from two to six people (M = 2.7, SD = 1.2). Just under half (46%) owned two companion animals (range 1 to 8), with 54% owning one companion animal.

Procedure

Participants in both study 1 and 2 were approached by the senior author at a university campus ground and asked if they owned a dog and/or cat and whether they would share their

thoughts and feelings about them. Participants were in a courtyard and all those who were sitting were approached. They were informed that the survey was voluntary, confidential, had ethical clearance, and would require 30 minutes of their time. All students who identified themselves as owning at least one dog or cat agreed to participate (response rate 100%) and were handed the questionnaire. They were told to consider the animal they were closest to when answering questions.

Measures

Sources of Social Support Scale: Study 1 participants completed the Multidimensional Scale of Perceived Social Support Scale (MSPSS) (12 items) (Zimet et al., 1988). We added six more items to the MSPSS (i.e., total 18 items), with the aim of identifying pets as an additional source of support. We used original MSPSS items and substituted the word "pet" into each item to reflect an owner's perception of support from their pet (e.g., "I can count on my pet to be there for me when things go wrong"). Items are based on social support theory and tap into the perceptions of another being there for emotional and instrumental support. The original scale measures perceived social support from family (4 items), friends (4 items), and significant others (4 items). It is rated on a 7-point Likert scale (1 = absolutely disagree, to 7 = absolutely agree) and has good internal reliability and validity (Cronbach's α for total scale = 0.88, and the subscales significant other = 0.91, family = 0.87, friends = 0.85). Scores for each of the four sources of support are summed and averaged for each subscale and can also be summed and averaged for the total scale.

Companion Animal Attachment Scale: Study 1 participants completed the original version of the 60-item companion animal attachment scale and participants in study 2 completed the revised 31-item scale. Items were derived from three sources. We used items from previously published pet attachment measures: for example, Owner Pet Relationship questionnaire (Winefield et al., 2008); Lexington Attachment to Pets Scale (Johnson, Garrity, & Stallones, 1992); the Pet Relationship Scale (Kafer, Lago, Wamboldt, & Harrington, 1992); the Companion Animal Bonding Scale (Poresky, 1987); and the Pet Attachment Scale (Holcomb, Williams, & Richards, 1985). Extra items were generated by the primary author to reflect the four features of secure attachment from attachment theory (e.g., "I miss and get upset when my pet is not around me" = separation distress) and the emotional support aspect of social support theory (e.g., "My pet provides me with major stress relief when times are tough"). Finally, items were generated from anecdotal evidence from the primary author's (a practicing veterinarian) discussions with clients during consultations about their experiences of companion animal ownership. These items reflected common comments to the author about clients' thoughts and behaviors toward their pets (e.g., "I like having lots of photos and reminders of my companion animal around me").

For consistency, all items were rated on a 7-point Likert scale, as this is what is used in the original MSPSS, with scores ranging from 1 ("absolutely disagree") to 7 ("absolutely agree"). Twenty-three items were reversed-worded to reduce positive response bias (e.g., "My pet does not add significant happiness to my life"). After accounting for reverse wording, total scores reflect the strength of companion animal attachment, where a higher score is indicative of stronger companion animal attachment.

Attachment Hierarchy Scale: Study 2 participants completed a modified version of Hazan and Zeifman's (1994) WHOTO interview (Hazan & Zeifman, 1994) that identifies attachment figures

and measures the four behavioral features of attachment (i.e., PS, SB, SH, SD) within attachment relationships (Ainsworth, 1991). Participants identify and then rank in order the most important relationship (e.g., mother, brother, romantic partner, best friend) that they perceive as fulfilling each of the four attachment behaviors. In the instructions about how to complete the measure, the word "pet" was added to the list of possible relationships. When a participant identifies and ranks a relationship as number one for all four attachment behavioral features, that relationship is regarded as their primary attachment figure. Lower numbers reflect greater saliency of that relationship for that attachment behavior.

Commitment to Companion Animals: Study 2 participants completed the Miller Rada Commitment to Companion Animals Scale (MRCPS) (Staats, Miller, Carnot, Rada, & Turnes, 1996), which was chosen to provide convergent validity for the revised 31-item companion animal attachment scale. Companion animal commitment is defined as a resolve to keep a companion animal in spite of challenges that require expenditures of personal resources. Commitment to a pet has been demonstrated as correlating with the construct of pet attachment (Staats et al., 1996). We chose this scale for convergent validity, as research suggests that highly bonded clients, while cognisant of pet healthcare costs, are more likely to prioritize their pets' veterinary healthcare treatment and wellbeing over costs (Lue, Pantenburg, & Crawford, 2008).

The MRCPS contains 10 items about reasons for abandonment such as destructiveness, toilet training, and extensive veterinary care. Items are rated on a 5-point Likert scale, with 1 defined as "strongly disagree" and 5 as "strongly agree." In this study, we reverse-scored items, so higher scores reflected greater commitment to keep a companion animal in spite of financial, behavioral, and health problems. The scale has good internal reliability ($\alpha = 0.90$).

Demographic and Companion Animal Ownership Variables: Participants from both studies answered demographic questions such as age, gender, ethnicity, marital status, living status, number of children, companion animal ownership experience, and number of pets owned. We added these items as most studies report reliable and consistent demographic patterns supporting the construct validity of companion animal attachment. For example, highly attached people tend to be female (Archer & Ireland, 2011) live with few people, and spend more time with their companion animal (Holcomb et al., 1985; Johnson et al., 1992; Poresky, 1997).

Data Analysis

Means, standard deviations, medians, and ranges of the data were calculated using SPSS Statistics for Windows, Version 22.0 (Armonk, NY, USA). Normality was visually checked using frequency distributions and P-P plots and calculated using the Kolmogorov-Smirnov (K-S) test. Principal components analysis (PCA), with and without orthogonal and oblique rotation, was used to explore and clarify the components of the modified MPSS.

PCA was also used to summarize and reduce the items in the pet attachment scale. We report the varimax (orthogonal) rotation for this because the same pattern of loadings was noticed regardless of rotation method, and the four-component varimax rotation achieved the most simple structure and provided meaningful interpretation of the construct "pet attachment." Simple structure was achieved with varimax as there were high loadings on each component, with minimal loadings on others and few complex loadings. Reporting the varimax is appropriate when using exploratory PCA, if the goal is to achieve simple structure and ease of interpreting the rotated matrix (Tabachnick & Fidell, pp. 622–647). All statistical tests were evaluated against $p < 0.05$.

Table 1. Companion animal owners' mean agreement level of perceived social support from significant others, families, friends, and pets (7-point Likert scale).

Source of Support	Overall (n = 159)		Males (n = 47)		Females (n = 114)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Sig. Other	6.02	1.13	5.40	1.44	6.27	0.87
Family	5.86	0.97	5.60	1.05	5.97	0.93
Friends	5.66	1.18	5.27	1.23	5.81	1.12
Pets	4.60	1.41	4.27	1.49	4.74	1.36

Table 2. Reliability analysis of the modified 18-item Multidimensional Perceived Social Support Scale using principal components analysis: Component loadings[a], eigenvalues, and Cronbach's alphas.

Subscale and "Items"	Loadings[a]	Eigenvalue	% of Total Variance	α
Pets		4.34	24.10	0.92
"Share my joys with"	0.87			
"Cares about my feelings"	0.87			
"Count on my companion animal"	0.86			
"Help me"	0.82			
"Comforts me	0.80			
"Can talk to"	0.80			
Significant Other		3.30	18.32	0.92
"Share my joys with"	0.86			
"Comforts me"	0.85			
"There for me"	0.85			
"Cares about me"	0.81			
Friends		3.21	17.84	0.91
"Can count on"	0.88			
"Share joys with"	0.84			
"Helps me"	0.84			
"Talk to about my problems	0.79			
Family		3.03	16.86	0.89
"Emotionally helps me"	0.90			
"Talk to about my problems"	0.84			
"Tries to help me"	0.79			
"Helps make decisions"	0.75			

[a] Loadings after principal components analysis with varimax rotation.

Results

Are Companion Animals Perceived as a Source of Social Support?

Overall, respondents on average "agreed" (M = 4.60, SD = 1.41) that their companion animals were a source of social support for them. They reported the highest levels of perceived social support, in order of importance, from a significant other, followed by family, friends, and pets (Table 1). Males reported their family to be most supportive followed by a significant other, friends, and companion animals, whereas females reported a significant other to be most

Table 3. Final 31-item Emotional and Supportive Attachment to Companion Animals Scale (ESACA) and component loadings (principal components analyses with varimax rotation). Items above 0.5 are in bold.

Items	Component 1	2	3	4
1. I take very little notice of my pet*	**0.78**	0.16	0.25	0.20
2. I don't interact too much with my pet at all*	**0.76**	0.19	0.09	0.03
3. I am not very committed to my pet*	**0.74**	0.16	0.10	0.31
4. I like spending time patting and cuddling my pet	**0.71**	0.28	0.34	0.00
5. My pet is the most important companion in my life	**0.70**	0.24	0.30	0.13
6. I don't like having my pet around me*	**0.69**	0.05	0.20	0.12
7. I don't feel very close to my pet*	**0.68**	0.24	0.31	0.22
8. My pet is a source of bother for me*	**0.65**	0.15	0.11	0.44
9. My pet doesn't add significant happiness to my life*	**0.60**	0.17	0.29	0.22
10. Some of my friends/family think I am obsessed with my pet	0.01	**0.77**	–0.02	0.24
11. My pet gives me a reason for getting up in the morning	0.10	**0.75**	0.29	0.26
12. I miss and get upset when my pet is not around me	0.10	**0.74**	0.16	0.11
13. I get lonely when my pet is not around me	0.12	**0.73**	0.32	0.03
14. I think about my pet frequently when I am away from him/her	0.29	**0.71**	0.12	0.13
15. I like having lots of photos and reminders of my pet around me	0.27	**0.68**	0.17	0.00
16. I spend a lot of time grooming and petting my pet	0.37	**0.67**	0.13	0.13
17. Nothing else matters as long as my pet is happy and healthy	–0.05	**0.67**	0.23	0.39
18. I frequently talk to my pet about things in my life that stress me	0.07	**0.64**	0.24	0.16
19. I like spoiling and buying presents for my pet	0.36	**0.61**	0.23	0.19
20. I feel confident going out to do things knowing my pet will always be there for me	0.17	**0.56**	0.20	0.29
21. My pet needs my love and attention	0.37	0.16	**0.68**	0.00
22. My pet knows when I am sad	0.15	0.23	**0.67**	0.16
23. My pet needs my affection	0.38	0.12	**0.66**	–0.12
24. My pet is a source of unconditional love	0.34	0.32	**0.60**	0.04
25. My pet will always be there for me	0.32	0.28	**0.60**	0.21
26. My pet is like another member of the family	0.44	0.29	**0.55**	0.29
27. My pet is like a best friend	0.39	0.45	**0.54**	0.32
28. My pet understands how I feel	0.06	0.48	**0.52**	0.32
29. I would do anything to help save my pet if he was hurt/sick no matter what the inconvenience to me	0.29	0.19	0.32	**0.67**
30. If it was going to cost me a lot of money to fix my pet I would consider putting him/her to sleep*	0.22	0.15	0.14	**0.57**
31. My pet annoys me at times*	0.33	0.26	–0.07	**0.55**

*Items are reverse-scored.

supportive followed by family, friends, and pets. When compared with males, females perceived higher overall support from friends ($t_{(159)} = 2.22$, $p < 0.05$), family ($t_{(159)} = 2.71$, $p < 0.01$), and a significant other ($t_{(159)} = 3.87$, $p < 0.01$).

The modified MSPSS was examined using PCA, with and without varimax rotation, to check the reliability of the scale and its ability to differentiate the four sources of social support

Table 4. Summary of the principal components analysis (with varimax rotation) of the 31-item ESACA scale (total $\alpha = 0.96$).

	Component			
	1	**2**	**3**	**4**
Eigenvalue*	12.3	11.2	6.8	4.0
% of total variance	20.6	18.7	11.4	6.7
Number of items	9	11	8	3
Loading range	0.60 to 0.78	0.56 to 0.77	0.52 to 0.68	0.55 to 0.67
Cronbach's α	0.93	0.92	0.90	0.74
Labels	Proximity maintenance & interaction	Emotional attachment behaviors	Emotional support given and received	Emotional and monetary value

*$n = 161$.

(Table 2). A loading of greater than 0.6 was used as a cut-off for components, and inspection of the eigenvalues >1 and scree plot supported the four-component solution that explained 77.1% of the variation in responses. As expected, all four items from each source of the original 12-item MSPSS had high loading scores (> 0.75). All six "pet" items that were added to the original scale had high loadings and were retained because the total scales' reliability was reduced when they were deleted. The total scale reliability was 0.90 and the subscales were also high: pet ($\alpha = 0.92$), significant other ($\alpha = 0.92$), friend ($\alpha = 0.91$), and family ($\alpha = 0.89$).

Measuring Companion Animal Attachment

Component structure and construct validity of the initial 60 items were evaluated using PCA. The scale was refined and any item with a component loading of less than 0.5 was removed. Sixteen items were eliminated from component one, five items from component two, five items from component three, and three from component four resulting in a 31-item scale. Items were analyzed for crossloading at 0.35 and above. After PCA and orthogonal and oblique rotation, the eigenvalues (greater than 1), scree plot, and interpretability of the components supported a four-component solution using varimax (orthogonal) rotation and accounting for 57.4% of the item variance. Component loadings after rotation for the final 31 items are presented in Table 3.

The components were interpreted and named (Table 4). The first comprised nine items and was labelled "Proximity maintenance and interaction," with a Cronbach's α of 0.93. The second comprised 11 items and was labelled "Emotional attachment behaviors," with a Cronbach's α of 0.92. Items 16 and 19 had crossloadings greater than 0.35 on another component and were retained as they assisted in the interpretation of the meaning of the component. The third comprised eight items and was labelled "Emotional support given and received," with a Cronbach's α of 0.90. Items 26, 27, and 28 had crossloadings on one other component > 0.35. We decided to keep these items because they also assisted in interpreting the meaning of the component. The fourth comprised three items and was labelled "Emotional and monetary value," with a Cronbach's alpha of 0.74. The reduced scale was named the "Emotional and supportive attachment to companion animals scale" (ESACA).

The final, revised 31-item ESACA showed strong psychometric reliabilities: the Cronbach's α for the total scale was 0.96; for the subscales it was 0.93 (proximity maintenance and

Table 5. Intercorrelations between demographics, companion animal commitment, companion animal attachment (ESACA), and mean hierarchical ranking of companion animal relationship. Significant correlations are in bold.

Variables (n^a)	1.	2.	3.	4.	5.	6.	7.	8.
1. Gender (83)	_							
2. Age (82)	–0.11	_						
3. Living status (82)	–0.13	–0.21	_					
4. Number of pets (83)	0.21	–0.11	0.00	_				
5. Hours spent with pets (83)	0.20	0.09	**–0.28***	0.03	_			
6. Hierarchical ranking of pet (21)	0.01	**–0.49****	**0.51***	0.19	–0.18	_		
7. Commitment to pet (82)	0.11	0.11	0.02	0.08	**0.30****	0.20	_	
8. Attachment to pet (79)	**0.34****	**0.26***	**–0.24***	0.10	**0.44****	**–0.56****	**0.40****	_

*$p < 0.05$ (two-tailed). **$p < 0.01$ (two-tailed).

[a] Totals may vary due to missing values.

interaction), 0.92 (emotional attachment behaviors), 0.90 (emotional support given and received), and 0.74 (emotional and monetary value). The inter-scale correlations ranged from 0.54 to 0.71, suggesting that it can be used as a unidimensional scale and oblique rotation may better define them. We decided to report the varimax rotation rather than oblique because the component structure, loadings, and cross-loadings were very similar regardless of rotation type and to help simplify the reporting of the PCA in this paper. Also, for the purpose of this study, we reported and described the four scales as we did not want to lose information provided by each component about the construct pet attachment. The scale yields a total attachment score ranging from 31 to 217, with a higher score indicative of greater attachment to companion animals.

In study 2, the ESACA was normally distributed, with scores ranging from 97 to 213 ($M = 157$, $SD = 27$, $n = 83$) and had excellent internal reliability ($\alpha = 0.95$). Convergent validity was evident with moderate correlation with the Commitment to Animals Scale ($r_{(79)} = 0.40$, $p < 0.01$). Significant correlations for the 31-item ESACA and demographic items also supported the construct validity of the scale (Table 5). Gender showed a mild, significant positive association with companion animal attachment, indicating females, compared with males, rated themselves as more attached to their companion animal ($r_{(79)} = 0.34$, $p < 0.01$). Age showed a mild but significant relationship with attachment: older respondents were more attached to their companion animals than younger ones ($r_{(79)} = 0.26$, $p < 0.05$). Companion animal attachment and living status showed a negative relationship, such that the fewer the number of people living in a household, the higher the attachment to companion animals ($r_{(79)} = –0.24$, $p < 0.05$). Attachment and number of hours interacting with the pet was significant ($r_{(79)} = 0.44$, $p < 0.01$): owners who reported spending more time interacting with their pet scored higher on the pet attachment scale than those spending less time. Respondents who scored highly on the pet attachment scale also were significantly more likely to rank their pets as important providers of a particular attachment behavior ($r_{(79)} = –0.56$, $p < 0.01$) than those less attached.

Attachment Hierarchy Characteristics

Respondents included pets in their hierarchy of important relationships, along with romantic partners, mothers, fathers, best friends, and siblings (see Table 6). In order of importance,

Table 6. Overall mean rankings and attachment behavior mean rankings for respondents' cited attachment relationships.

Relationship	Overall Mean Rankings (*SD*)*	Mean Ranks for the Four Behavioral Features of Attachment (*SD*)				*n**
		Proximity Seeking	Safe Haven	Separation Distress	Secure Base	
Partner	1.6 (0.74)	1.6 (0.84)	1.6 (0.93)	1.8 (1.21)	1.9 (0.33)	29
Mother	2.2 (0.56)	2.8 (0.92)	2.0 (0.78)	2.0 (0.89)	2.2 (0.93)	28
Best Friend	2.3 (1.00)	2.1 (1.13)	1.2 (1.46)	2.6 (1.33)	2.5 (1.39)	27
Father	2.6 (0.74)	3.4 (1.13)	2.5 (1.05)	2.8 (1.05)	2.6 (0.93)	16
Pet	2.8 (1.16)	2.5 (1.35)	3.0 (1.50)	3.0 (1.41)	3.4 (1.41)	21
Sibling	3.1 (1.07)	3.2 (4.76)	3.3 (1.60)	3.5 (1.26)	3.4 (1.39)	11

Lower numbers reflect a *greater* tendency to use these relationships as attachment figures on that feature.

*Varies due to missing values, as not all respondents identified all six relationships.

companion animals were ranked fifth, ahead of siblings, but behind romantic partners, mothers, best friends, and fathers for safe haven, separation distress, and secure base. For proximity seeking, companion animals were ranked third, ahead of mothers, siblings, and fathers, but behind romantic partners and best friends.

Separate item analysis was calculated for the six relationships most commonly listed, as this mirrors Trinke and Bartholomew's (1997) analysis of the characteristics of an individual's attachment hierarchy. Scale reliabilities (Cronbach's α) for each relationship ranged from low to high: mother (0.56), father (0.71), romantic partner (0.72), best friend (0.80), sibling (0.84), and companion animal (0.88). The median number of relationships identified in a participant's attachment hierarchy was 5 (range: 2 to 8). When a participant ranked a relationship as number one in fulfilling all four attachment features, that relationship was considered their primary attachment figure. Of the 83 participants, 52 identified primary attachment figures. In descending order of frequency, the relationships most cited were romantic partners (n = 21), best friends (n = 14), mothers (n = 7), companion animals (n = 6), fathers (n = 2), and siblings (n = 2). There were no significant age or gender differences for mean overall rankings or rankings of components.

Discussion

The purpose of this paper was to use social support theory and attachment theory to investigate pets as a unique source of social support and as potential secure attachment figures within a person's attachment hierarchy. We also developed and validated, to some degree, a pet attachment scale and a multidimensional scale of perceived social support that included pets as a source of emotional and instrumental support.

Are Companion Animals a Source of Social Support?

In study 1, we investigated the degree to which owners considered their companion animals as socially supportive, using a social support scale including pet items. As expected, owners perceived their companion animals to be a unique source of social support, differentiating them from other human sources such as friends, family, and significant others. Previous research shows that children, adolescents, and older people perceive their pets as emotionally supportive (Bodsworth & Coleman, 2001; Sable, 1995; Triebenbacher, 1998). Zimet et al.

(1988) suggests that research about social support that fails to consider different sources of support (e.g., companion animals, mentors, and psychotherapists) might lose important information about that individual's social support network. We found that while owners ranked their companion animals last in order of importance as a source of social support, they clearly identified them as a distinct source of emotional and instrumental support. In addition, highly attached pet owners perceived greater support than those less attached. These results are consistent with Stammbach and Turner (1999), who found that the stronger the attachment to cats, the more emotional support owners feel they receive from them. Smolkovic et al. (2012) also found highly attached pet owners had higher social support from family than those less attached; however, they did not include pets as a source of support in their social support measure. Overall. these results suggest that pets may be considered as an additional source of emotional and instrumental support in an owner's social support network, especially for those who are highly attached to their pet.

Are Companion Animals Included in a Pet Owner's Hierarchy of Attachment Relationships?

As expected, owners included companion animals in their attachment hierarchy, ranking them, in order of importance, fifth (ahead of siblings, but behind romantic partners, mothers, best friends, and fathers). In addition, 14% of owners perceived their companion animal as their primary attachment figure, providing all four behavioral features of attachment. The higher their attachment to their companion animal, the higher they ranked it within their attachment hierarchy. These findings suggest that pets may fulfill all four behavioral features of an attachment relationship, especially for those highly attached. These findings support and build on Kurdeck's (2009) pet attachment studies (Hazan & Zeifman, 1999; Kurdek, 2009; Trinke & Bartholomew, 1997). Kurdek explored owners' perceptions of their dogs on rankings of the safe haven attachment behavioral feature. Our findings suggest pets can be considered a potential attachment relationship and a primary AF for highly attached owners for all four behavioral features (i.e., proximity seeking, secure base, separation distress, and safe haven). Trinke and Bartholomew (1997) demonstrated that during the transition from adolescence to adulthood, an individual's attachment hierarchy expands to incorporate other attachment relationships, such as peers and romantic partners. Our findings support the notion that companion animals are potential primary attachment figures for owners.

Companion Animal Attachment Measure

In studies 1 and 2, we also developed a measure of companion animal attachment, and PCA indicated four subscales. The first two subscales, "proximity maintenance and interaction" and "emotional attachment behaviors," appear to reflect behavioral features of attachment theory. The third subscale, "emotional support given and received," reflects the emotional dimension of social support theory. Finally, the fourth subscale "emotional and monetary value" reflects a dimension of companion animal attachment not often reported in previous measures.

The final 31-item companion animal attachment scale showed good internal reliability ($\alpha = 0.96$) and item-total correlations. The measure has good content validity as items were generated from attachment theory and social support theory. The face validity of the items was good, as each item referred to a behavior, thought, or emotion specifically about the human–animal relationship, not just companion animal attitudes. Convergent validity was demonstrated through moderate correlation with the Commitment to Companion Animals Scale (Staats et al., 1996). Finally, significant correlations between the companion animal attachment scale and

demographic variables in both study 1 and study 2 further support the construct validity of the measure. Specifically, we found that females were more attached to their companion animals than males, owners who lived with fewer people were more attached to their companion animal, and owners who spent more time interacting with their pet were more attached to it. These findings replicate associations with demographic characteristics in published companion animal bonding measures (Holcomb et al., 1985; Johnson et al., 1992; Kafer et al., 1992).

Limitations

The current study has limitations. First, respondents were a small convenience sample of university students with an overrepresentation of female students. Therefore, the findings may not generalize to pet owners with more diverse backgrounds (e.g., educational), of other age groups (e.g. older adults), and who are male. In particular, the low sample size for the attachment hierarchy questionnaire reduces generalizability of these findings. Second, the very high response rate and proportion of female respondents suggests selection bias. One reason for the high response rate was that most students were sitting in groups when asked if they owned a pet and would be willing to complete the survey. Because we did not individually ask each person within the groups, we may not have identified those who owned a pet and were not willing to complete a survey. Third, the self-report items of the measures are prone to social desirability bias and reflect subjective perceptions not actual behaviors. Future studies could utilize the behavioral and physiological indicators of attachment that have been published (see Julius et al., 2013; Odendaal & Meintjes, 2003; Rehn, McGowan, & Keeling, 2013; Topál, Miklósi, Csányi, & Dóka 1998). Fourth, caution is needed when interpreting the correlation between the perceived social support measure and secure attachment measures. Some items from the perceived support measure tap emotional social support and these items have similar wording to secure safe haven attachment items in the attachment hierarchy measure and the pet attachment measure. A criticism of self-report items measuring attachment is that they may not actually represent or measure the inner working model according to attachment theorists. Fifth, our measure comprised items that mainly measure secure attachment behaviors rather than insecure. Investigating pet attachment and differences between secure and insecure attachment as other researchers have done (see Beetz et al., 2012) would help elucidate differences in attachment styles. Finally, our companion animal attachment scale requires further reliability testing such as confirmatory factor analysis and selective sampling of participants outside of a university to increase generalizability.

Conclusion

The current study contributes more evidence to the human–animal relationship literature about the emotional role and value of companion animals; companion animals may be perceived by owners as an additional source of emotional and instrumental social support. Our study also suggests that companion animals can function as primary attachment figures, fulfilling all four secure attachment features in companion animal owners' hierarchy of attachment relationships, and supports previous research suggesting that companion animals provide an important supportive role for pet owners. Third, a pet owner's attachment hierarchy is a useful and measureable conceptual framework when using attachment theory to explore the emotional role and value of companion animals. While our pet attachment scale has limitations and still requires further validation with other population groups, we believe it provides a broad measure of companion animal attachment.

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Conflicts of Interest

The authors state there are no conflicts of interest.

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Perceptions of Dogs in the Workplace: The Pros and the Cons

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ABSTRACT With growing interest in the value of animal companionship to human health, and increasing business awareness of promoting work-based health innovations and improving employees' feelings of support, there has been a rise in interest about allowing dogs in the workplace (e.g., "Take your dog to work day" initiative; Pet Sitters International, 2015). However, there is little scientific literature about the advantages or disadvantages of such practice to support decision makers. We report the results of an internationally promoted survey to assess perceptions of dogs in the workplace, promoted through a "Take your dog to work" initiative. Responses to four open-ended questions were analyzed for themes across 776 participants. Common barriers to allowing dogs at work included the suitability of the working environment (44%) and health and safety concerns (31.3%). Where dogs were permitted in the workplace, there appeared to be little regulation of this, with few formal policies in place (63.8% had no guidelines/policies). The majority of those surveyed believed their colleagues had no concerns about having dogs at work (63.3%); the main potential problems that were recognized included a dislike of dogs (16.7%) and cleanliness issues (6.7%). Respondents made generally positive comments about having dogs at work (43.1%), referring to specific benefits including increased social interactions and reduced stress and improved atmosphere of the office. The implications of these findings are discussed for businesses and the development of "dog in the workplace" policies.

Keywords: dogs in the workplace, employee benefits, health and safety, workplace policies

The evidence in favor of the mental health benefits of interaction with pets has led to a rise in the use of animal-assisted interventions (AAI) in structured visitation programs to organizations such as nursing homes and schools. It follows that well-behaved pets in

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the workplace could also yield important benefits to employee health and workplace performance. We briefly consider theoretical possibilities for allowing dogs in the work which may bring about positive improvements to the employees, before assessing the current literature in this area and the aims of the present study.

Dogs in the workplace may promote mental wellbeing. A number of studies have identified the value of dogs to human mental health, particularly in terms of reducing stress, depression, and anxiety (e.g., Allen, Blascovich, Tomaka, & Kelsey, 1991; Souter & Miller, 2007), and promoting social interactions and feelings of support (Duvall Antonacopoulos & Pychyl, 2008; McConnell, Brown, Shoda, Stayton, & Martin, 2011; McNicholas & Collis, 2000). Mental health problems, such as depression and anxiety, are expected to be the leading explanation for work incapacity by 2020, surpassing that associated with some common physical health issues (Mathers & Loncar, 2006). Job stress and feelings of support interrelate to affect intention to leave the place of employment (Kim & Stoner, 2008), as well as job satisfaction and coping (Collins, 2008).

Dogs may facilitate cognitive performance at work. Although, there is a lack of research on the impact of dogs on adult's cognitive performance, those conducted with children reveal that the presence of a friendly dog improves motor and cognitive abilities, perhaps by increasing motivation and attention (Gee, Crist, & Carr, 2010; Gee, Harris, & Johnson, 2007; Gee, Sherlock, Bennett, & Harris, 2009). If such improvements translate to adults in the workplace, then they could have a significant impact on outputs.

Allowing dogs at work may provide non-dog owning employees access to the benefits of animal companionship and reduce the stress felt by owners at leaving their dog during working hours (Westgarth et al., 2007). Both dog owners and non-dog owners perceived stress increases over the working day, yet owners who had their dog with them reported decreased stress over the day (Barker, Knisely, Barker, Cobb, & Schubert, 2012). This could have important implications for businesses, since work-based stress increases cognitive strain and diminishes motivation and memory processes, reducing employee performance (LePine, Podsakoff, & LePine, 2005) and increasing absenteeism and dysfunction (Colligan & Higgins, 2006). As such, there is growing awareness that improved employee satisfaction increases organizational performance (Abbott, 2008; Fischer & Sousa-Poza, 2009). This may be achieved, in part, by allowing the presence of dogs in the workplace, bringing benefits such as reduced stress and resentment at leaving a dog at home, and allowing non-dog owners to benefit from animal companionship.

Despite this promise, there have only been a few studies that have explored the effect of dogs in the workplace. These studies generally indicate that the majority of dog owners would prefer to bring their dog to work than leave it at home or seek day care (Norling & Keeling, 2010). Many believe that pets reduce stress and improve health and the general pleasantness of the working environment, benefiting the organization as a whole (Barker et al., 2012; Perrine & Wells, 2006; Wells & Perrine, 2001). Nonetheless, there is evidence that some employees would not welcome dogs at work, due to a fear of them, finding them a distraction, impairment to the cleanliness of the work environment, and allergies (Wells & Perrine, 2001). However, there is little research exploring whether the benefits of taking dogs to work outweigh the negatives. The available studies have been conducted on a fairly small scale (e.g., Norling & Keeling, 2010; Wells & Perrine, 2001) or lack a representative sample (e.g., Perrine & Wells, 2006).

The aim of the present study was to qualitatively explore perceptions of dogs in the workplace. Specifically, we examined existing work-based policies for allowing, or preventing,

dogs at work, and the perceived pros and cons of having dogs in the work environment. By focusing on these specific objectives, we aimed to provide a source of information for employers wishing to develop policies for dogs in the workplace. We propose a rational framework for considering when the advantages of dogs in the workplace may outweigh the disadvantages, in order to capitalize on the health, social, and economic benefits that this may bring.

Methods

Ethics

All procedures complied with the British Psychological Society "Code of Ethics and Conduct," and with the World Medical Association Helsinki Declaration, as revised in October 2008. The ethical committee in the School of Science, University of Lincoln approved the study. Participants gave informed consent at the start of the survey.

Item Generation

The survey items were developed using a qualitative interview approach; the interviews were conducted with owners who did and did not take their dog to work. Using an interview-to-redundancy approach, the interviews were transcribed, coded, and analyzed for emerging themes; the themes which were used to create the survey items.

Survey

The online survey (hosted through Survey Monkey) was piloted to determine its ease of use, and the final version was launched on 29 May, 2012 and promoted in relation to "Take your dog to work day" (22 June, 2012). "Take your dog to work day" is a national campaign designed to promote the value of dogs in the workplace. The campaign highlights some of the issues surrounding having dogs in the workplace and encourages organizations to allow their employees to bring their dogs into work for the day. The survey was also advertised via the University of Lincoln's social media and press team. Advertisements to participate in the survey linked to information and stories centered on "Take your dog to work day."

Respondents

For the purposes of this report, we selected from the total number of respondents (n = 1,848) those individuals whose work did not directly involve animals (n = 1,188), and from that total, those who worked in an office-based environment (n = 776; total sample included in analysis). The environment in which the respondents worked was determined by their response to a multiple-choice question: "What environment do you work in?" Those individuals who selected "own office type environment at place of employment" and "shared office with two or more people/open plan office" were included in the analysis. From the 776 respondents, 12% (n = 95) were allowed to take their dog to work, 85% (n = 654) were not allowed, and 3% (n = 27) did not know if they were allowed. The most represented age group was 36–50 years (n = 371, 47.8%), followed by 26–35 years (n = 243, 31.3%), 51 years and over (n = 124, 16%), 19–25 years (n = 31, 4%), and 16–18 years (n = 1, 0.1%). Six respondents chose not to select their age category (0.8%). Most of the responses came from employees residing in the UK (n = 551, 71%), followed by the USA (n = 114, 14.7%), Finland (n = 24, 3.1%), Australia (n = 18, 2.3%), Netherlands (n = 12, 1.5%), and Brazil (n = 10, 1.3%). Fewer than 10 responses per country were derived from other European Union and world-wide countries (n = 27, 3.5%).

Data Analysis

To assess employee's perceptions of dogs in the workplace, content analysis was conducted separately on four items within the questionnaire:

(1) If employees aren't allowed to take dogs to the workplace, do you know of a reason for this?

(2) If employees are allowed to take dogs to the workplace, is there a policy for this and if known, what does it involve?

(3) If employees are allowed to take dogs to the workplace, do you know of any concerns from colleagues?

(4) If employees are allowed to take dogs to the workplace, do you know of any positive comments from colleagues?

Each question was analyzed separately for emerging themes using an inductive approach adhering to the basic principles of Braun and Clarke (2006). Each data point (participant response) was coded exclusively into one category, rather than multiple categories, in order to create clearly defined coding categories. Responses were coded across the entire response set, not separately based on demographic factors (i.e., there was no comparison between responses based on demographic items). All coding categories came inductively from the data. Categories were coded independently by two research team members, who then met to discuss any discrepancies. Discrepancies were rare and were resolved by discussing the data point in relation to other similar comments by the lead authors (SH & HW).

Results

The results are presented separately for each of the four questions and are displayed graphically in Figure 1. The quotes accompanying each question are tabled.

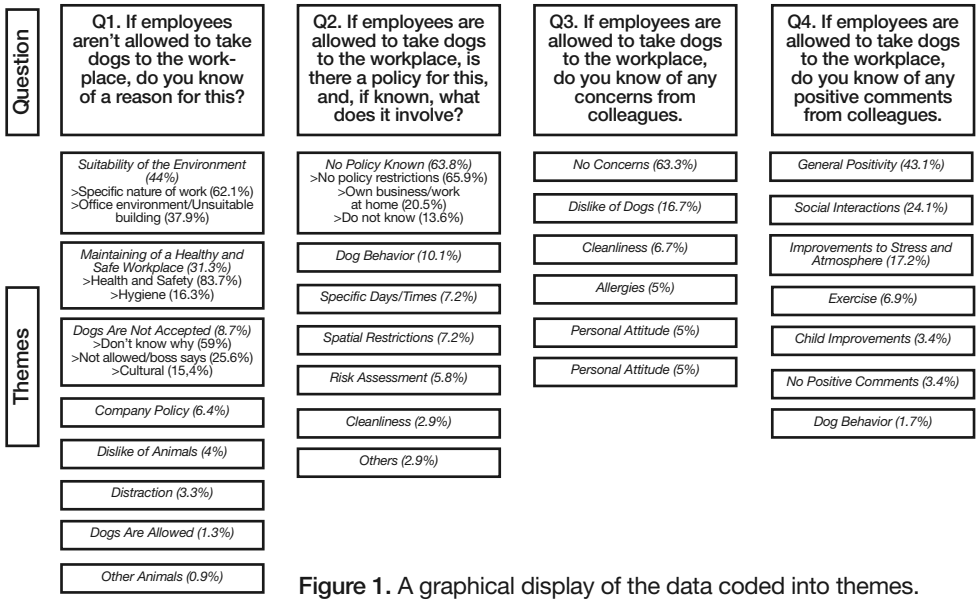

Figure 1. A graphical display of the data coded into themes.

Table 1. Quotes for the question: "If employees aren't allowed to take dogs to the work place, do you know of a reason for this?"

Theme 1: Suitability of the Environment
Specific Nature of Work
Work in a hospital
Office Environment/Unsuitable Building
Too many staff
City center office with 200+ employees
Not practical in a large professional office
Not professional to have dog in office
There would be no-one to watch them and no-where safe for them to be.
Too many dogs owned by staff, if we all took them in there'd be more dogs than people
Serviced offices, not owned by company
Theme 2: Maintaining a Healthy and Safe Workplace
Health & Safety
Considered health and safety risk
Dangerous place for dogs
Children and adults with severe challenging behaviors who show aggression towards staff who work there.
not safe to bring animal
Not suitable or safe for the dogs to go
Some employees are allergic to animals
Infection Control says dogs are a source of infection
Hygiene
It is a food and drink establishment so it would be unhygienic
I work in a medically clean environment, dog contamination with hairs would not be acceptable
Because they don't like the mess
Theme 3: Dogs are Not Accepted
Did Not Know Why
Not sure of reason
Not Allowed/Bosses Choice
The boss of the company isn't open to the option
Family run business and the business owner doesn't want dogs in the office
Cultural
Very rare companies in Brazil allow dog in the environment
It is not accepted in my country
Theme 4: Company Policy
Dogs banned from office building
University policy
Theme 5: Dislike of Animals
Too many customers and disruption
Theme 6: Distraction
N/A
Theme 7: Dogs are Allowed
Once my dog gets older, my boss will allow me to bring my dog in ... as long as the dog will lay under my desk and not roam around the office
Theme 8: Other Animals
Because we have Military Guard dogs
They have a cat

Question: If Employees Aren't Allowed to Take Dogs to the Workplace, Do You Know of a Reason for This?

The associated quotes are shown in Table 1. A total of 450 (58% of selected population) participants responded to this question. Eight themes emerged from the data: (1) suitability of the environment, (2) maintaining a healthy and safe workplace, (3) dogs are not accepted, (4) company policy, (5) dislike of animals, (6) distraction, (7) dogs are allowed, (8) other animals.

Theme 1: Suitability of the Environment: There were 198 comments coded into this theme (44% of the data), which is further divided into two categories (specific nature of work, 62.1%; office environment/unsuitable building, 37.9%).

a) *Specific Nature of Work:* Many people named specific aspects relating to the nature of their working environment as a reason for not being allowed to take dogs into work (n = 123, 62.1% of Theme 1). These responses included: (i) employment in healthcare environments (n = 38); (ii) employment in a school or child-based environment (n = 28); (iii) working in the food industry (n = 14); (iv) work that involved home visits or substantial travel (n = 12); (v) working in a public environment (n = 8); (vi) working in the retail industry (n = 8); (vii) working in a government/state organization (n = 8); (viii) work that involved handling specific materials and/or was situated in a laboratory (n = 7).

b) *Office Environment/Unsuitable Building:* The second largest category of responses mentioned working in an "office environment/unsuitable building" (Category 2: n = 75, 37.9% of Theme 1) as an explanation for why dogs were not allowed in their workplace. The majority of responses in this category were about the practicality of their office environment (n = 42). Other respondents stated that the professionalism of their work environment as a reason why dogs could not come to work (n = 13). Some respondents were concerned for dog welfare and that the office was not set up for anyone to look after the dogs safely (n = 9). Comments were made concerning the number of dogs that could be in the office if all employees were to bring their dog to work (n = 9). Finally, a few people (n = 2) stated that the offices were not owned by their company.

Theme 2: Maintaining a Healthy and Safe Workplace: One hundred and forty-one respondents (31.3% of the data) commented on various aspects of health and safety concerns in allowing dogs to come to the workplace. This theme was divided into two categories (health and safety, 83.7%; hygiene, 16.3%).

a) *Health & Safety:* Health and safety were commonly referred to, with 118 comments relating to this topic (83.7% of Theme 2). The majority of comments simply referred to "health and safety aspects" (n = 82). Within these 82 references to health and safety, 13 were concerned with the health and safety of the dog in the work environment. Other comments referred specifically to health implications (n = 36) including references to allergies (n = 21) and infection (n = 5). The remaining references were non-specific health-related terms (e.g., "health").

b) *Hygiene:* Twenty-three comments (16.3% of Theme 2) related to hygiene aspects of dogs in the workplace. Indeed, many respondents simply stated "hygiene," although there were some specific comments about food, dog hair, and dog mess.

Theme 3: Dogs Are Not Accepted: Thirty-nine responses (8.7% of the data) were categorized in this theme. Three categories emerged from this theme.

a) *Did Not Know Why:* Twenty-three respondents (59% of Theme 3) stated they that they did not know why dogs were not allowed at work, or that they had not asked why dogs were not allowed.

b) *Not Allowed/Bosses Choice:* Ten respondents (25.6% of Theme 3) simply stated it was not allowed or that the boss said it was not allowed.

c) *Cultural:* Six participants (15.4% of Theme 3) alluded to cultural norms as an explanation for why dogs were not accepted in the office.

Theme 4: Company Policy: Twenty-nine respondents (6.4% of the data) stated that it was specifically against the policy or rules of their place of employment.

Theme 5: Dislike of Animals: Eighteen responses (4% of the data) referred to a dislike of animals from fellow employees or from their boss. Two respondents were concerned with being scared or having a phobia of animals.

Theme 6: Distraction: Fifteen people (3.3% of the data) felt that having dogs in the office would be a distraction to their working ability, and therefore was the reason why dogs were not permitted in the office.

Theme 7: Dogs Are Allowed: Six people (1.3% of the data) stated that dogs were allowed in their office, albeit not all the time.

Theme 8: Other Animals: Four respondents (0.9% of the data) said dogs were not allowed at their place of work because of the presence of other animals.

Question: If Employees Are Allowed to Take Dogs to the Workplace, Is There a Policy for this and if Known, What Does It Involve?

A total of 69 participants responded to this question (9% of the selected population) and the associated quotes are shown in Table 2. Seven themes emerged from the data: (1) no policy known, (2) dog behavior, (3) specific days/times, (4) risk assessment, (5) spatial restrictions, (6) cleanliness, (7) others.

Theme 1: No Policy Known: Forty-four (63.8%) of the responses were classified under this theme. Twenty-nine respondents (65.9% of Theme 1) stated that there were no policies or restrictions for taking their dog to work. Nine respondents (20.5% of Theme 1) stated there was no policy on bringing dogs to work because they ran their own business, they were their own boss, or they worked from home. Six respondents (13.6% of Theme 1) stated that they did not know if there was a policy or not, suggesting that if “bring your dog to work” policies are in place they need to be more directly communicated to employees.

Theme 2: Dog Behavior: Seven participants (10.1% of the data) stated aspects regarding their dog’s behavior as a determiner on the acceptability of their dog attending the office.

Theme 3: Specific Days/Times: Five respondents (7.2% of the data) indicated that their dog was allowed into work with them, but only on specified days and/or times, not every day.

Table 2. Quotes for the question: "If employees are allowed to take dogs to the work place, is there a policy for this and if known, what does it involve?"

Theme 1: No Policy Known
No policy, but encouraged to give residents companionship and exercise No policy, casual agreement for dog owners I am self-employed so he comes to work I'm not aware of policies, but I've seen other employees bring their dogs on certain days Not sure, have been a few puppies that have come in but a very ad hoc thing no policy in place
Theme 2: Dog Behavior
Dogs to be kept under control at all times and not pose a danger to guests or other employees No policy other than well trained
Theme 3: Specific Days/Times
Employees may take their dogs to the work place for a reason (e.g., take dog to a vet after work, go to a vacation directly from work etc.) and of course employees must make sure that their dogs do not interrupt others
Theme 4: Spatial Restrictions
If I take my dog to office, I have to keep her in my own room Dogs sit in owners' offices. Many dogs, many offices
Theme 5: Risk Assessment
Risk assessment in place and need to be agreed to by the people we support Third party insurance, office risk assessment, water bowl, bed or cage or leash, forms have to be signed by various people and once permitted the dog has to wear a numbered tag. Also, a sign has to be on the office door to say there is a dog present
Theme 6: Cleanliness
No policy but we have to clean up after them
Theme 7: Others
Only my dogs allowed

Theme 4: Spatial Restrictions: Five responses (7.2% of the data) illustrated that some employees were allowed to take their dog to work if the dog was maintained within (or kept away from) specific spaces (including work cars) in the place of employment.

Theme 5: Risk Assessment: Four participants (5.8% of the data) mentioned that their dog was allowed to work with them if a risk assessment had been conducted and/or specific insurance was in place.

Theme 6: Cleanliness: Two respondents (2.9% of the data) stated cleanliness constraints on bringing their dog to work with them.

Theme 7: Others: Two respondents (2.9% of the data) made a comment that could not be classified into the other themes.

Question: If Employees are Allowed to Take Dogs to the Workplace, Do You Know of Any Concerns from Colleagues?

The corresponding quotes are shown in Table 3. Sixty responses were recorded to this question (8% of the population who responded to the survey). Six themes emerged from the data: (1) no concerns, (2) dislike of dogs, (3) cleanliness, (4) allergies, (5) personal attitude, (6) distraction.

Table 3. Quotes for the question: "If employees are allowed to take dogs to the workplace, do you know of any concerns from colleagues?"

Theme 1: No Concerns
No concerns to my knowledge ... most say our dogs are stress relievers—they come by and pet or play with the dogs throughout the day
No issues they adore the dogs and this has a relaxing effect on staff
Theme 2: Dislike of Dogs
Some have at first been a little afraid, but then got over their problem
People of certain cultures are nervous around the dogs, but are okay as long as there is a baby gate or door between them and the dog
Yes, one employee doesn't like dogs. I ignore him. My dog doesn't
One of my colleagues doesn't like dogs, so I haven't taken them in, even though I know I could
All the office staff are asked if they like dogs at interview—they are told that my dog(s) will be in the office from time to time
Theme 3: Cleanliness
Toilet training when he was younger
Some don't like dog hairs
No concerns apart from peeing on plants occasionally
Theme 4: Allergies
Some colleagues may have allergies
Theme 5: Personal Attitude
Occasional comments that they have to put their kids into child care
Some staff think it is cheeky
Theme 6: Distraction
Dogs distracting co-workers or work in general
Barking when on phone but not serious issue

Theme 1: No Concerns: Responses from 38 participants (63.3% of the data) indicated that they did not know of any concerns from their colleagues on allowing dogs in the work environment. Indeed, two respondents mentioned positive comments from employees on having a dog at work. One person mentioned that they work from home so there were no other colleagues to be concerned with the dog.

Theme 2: Dislike of Dogs: Ten respondents (16.7% of the data) believed their colleagues did not like dogs. Of these, seven stated a fear or phobia of dogs, while three indicated a more general dislike of dogs.

Theme 3: Cleanliness: Four participants (6.7% of the data) stated that their colleagues had concerns relating to the cleanliness of having dogs in the workplace. Specifically, three comments were made regarding toilet training and one referred to dog hair.

Theme 4: Allergies: Three participants (5% of the data) indicated that (some of) their colleagues had allergy concerns in having a dog at work.

*Theme 5: Personal Attitude: Three respondents (5% of t*he data) made reference to their colleagues having a generally negative attitude to having a dog in the workplace

Theme 6: Distraction: Two participants (3.3% of the data) suggested that having a dog in the workplace was sometimes a distraction to their colleagues.

Table 4. Quotes from the question: "If employees are allowed to take dogs to the workplace, do you know of any positive comments from colleagues?"

Theme 1: General Positivity
People like seeing my dogs
Everyone loves my dog, as do customers
The dogs draw positive attention
We love having our dog at work
Theme 2: Improved Social Interactions
Very positive to have around helps people to bond, makes the place brighter etc
Yes, people we support enjoy their companionship
I get visitors from downstairs when my dog is at work with me
A relaxing effect, engaging people in conversation
He is a good talking point, and often comes to meetings and good ice breaker
Theme 3: Improvements to Stress & Atmosphere
Workplace has become far less stressful and more fun
They like to relax and play with the dogs or just be with them, one even said that my old dogs snoring is relaxing when stressed
Yes, calming influence
Colleagues much happier at work and more productive
Theme 4: Exercise
Colleagues also bring dogs and walk them with residents
They all want to take the dogs for walks at lunch or any other time—post office etc
Theme 5: Child Improvements
Once a student very down in the dumps and struggling academically came for a meeting with my boss, and after her usual greeting Bea—who had never done this before—climbed up on the seat next to him and snuggled (she is not a small dog, so it was a tight squeeze)—the student felt special to know that she didn't do this to everyone and I think it really helped him
Autistic child reads to dogs while they are in their cage. Reading age and general eye contact etc. has improved
Theme 6: No Positive Comments
N/A
Theme 7: Dog Behavior
How well behaved mine have been

Question: If Employees are Allowed to Take Dogs to the Workplace, Do You Know of Any Positive Comments from Colleagues?

The corresponding quotes are show in Table 4. Fifty-eight responses were recorded to this question (7% of the selected population). Seven themes emerged from the data: (1) general positivity, (2) improvements to social interactions, (3) improvements to stress and atmosphere, (4) exercise, (5) child improvements, (6) no positive comments, (7) dog behavior.

Theme 1: General Positivity: Twenty-five individuals (43.1% of the data) made general (as opposed to specific), positive comments on their colleague's perceptions of dogs in the workplace. Many commented that colleagues loved seeing the dogs at work.

Theme 2: Improved Social Interactions: Fourteen respondents (24.1% of the data) said their colleagues commented on aspects relating to the social interactions of having a dog at work.

Theme 3: Improvements to Stress & Atmosphere: Ten respondents (17.2% of the data) indicated that the atmosphere in their working environment is better with dogs, with particular reference to the stress-reducing effects of the dog.

Theme 4: Exercise: Four people (6.9% of the data) mentioned that their colleagues like to take their dog for a walk during breaks.

Theme 5: Child Improvements: Two respondents (3.4% of the data) noted improvements in children's behaviors since taking their dog to work.

Theme 6: No Positive Comments: Two respondents (3.4% of the data) simply stated that there were no positive comments from colleagues.

Theme 7: Dog Behavior: One individual (1.7% of the data) said colleagues made comments about how well behaved their dog was.

Discussion

With the aim of identifying the perceived pros and cons of taking dogs to work, we conducted thematic analysis on responses to four questions from an internationally promoted survey on dogs in the workplace. Before discussing the pros of dogs at work, we briefly consider this project in relation to existing literature, and then discuss how the perceived barriers to dogs in the workplace may be resolved to the benefit of employers and employees (see Figure 2). Finally, we identify limitations and future research suggestions.

Despite the potential for dogs to improve the working performance of employees there is limited research in this area (Barker et al., 2012). The present research is the first study, to our

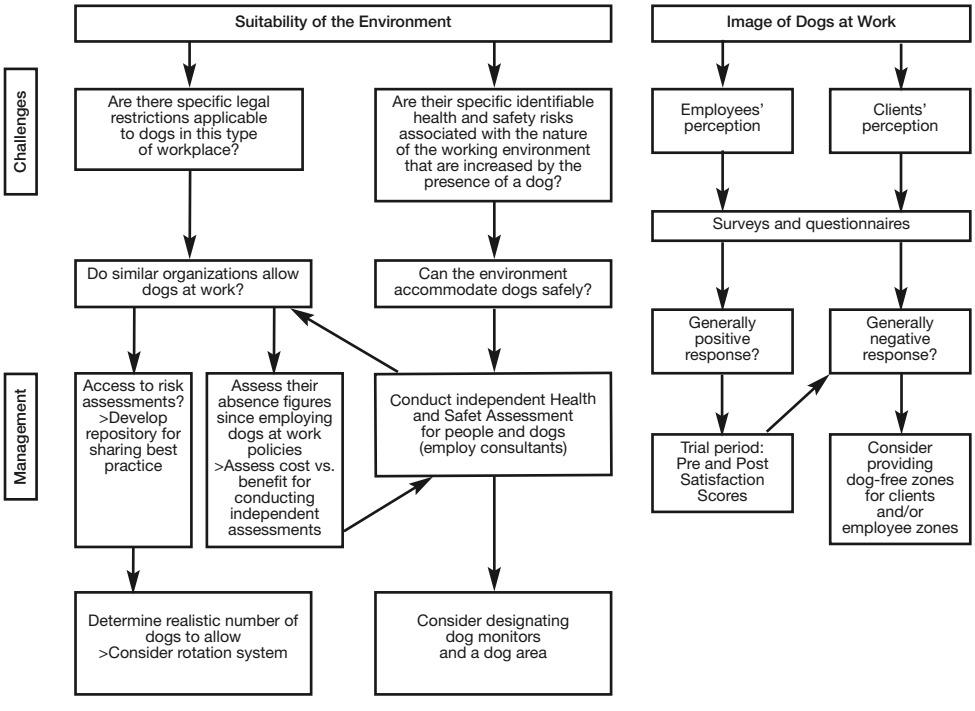

Figure 2. An illustration of stages involved in developing "Take your dog to work" policies.

knowledge, to investigate both the pros and the cons of dogs in the workplace on an international scale. Similar to the study of Norling and Keeling (2010), we identified that there are few "take your dog to work" policies in place in the majority of organizations. Consistent with previous studies, we found that a large number of employees believed that dogs in the workplace had a generally positive effect on the working environment (Norling & Keeling, 2010) and reduced employee stress (Barker et al., 2012). However, allergies and fear of dogs were a concern (Norling & Keeling, 2010).

The survey responses suggest that more pros than cons are associated with bringing a dog to work. In support of the AAI literature, having a dog in the workplace appeared to lift employees' moods, providing a positive focus which may help to alleviate depressive symptoms (e.g., LeRoux & Kemp, 2009; Souter & Miller, 2007). Reference to improvements in social interactions were frequently noted and could highlight a novel, cost-effective strategy for businesses to improve the feelings of support held by their employees. Specific reference to reductions in stress and anxiety in the workplace were observed, indicating that the mere presence of a dog in the office might have stress-reducing effects. This is compatible with recent research which has shown that pet dogs, as opposed to trained dogs used in AAI, can bring significant benefits to parenting stress levels in the home (Wright et al., 2015).

Where dogs are allowed at work this appears to be largely unmoderated. Clearly, if the potential benefits are to be capitalized on more widely, then it would be useful for those that do allow the practice to articulate how some of the perceived problems can be overcome and risks minimized (see Figure 2). It seems that for many, the practice is not allowed simply because it is not the norm and serious consideration has not been given to the subject; some responses were contradictory, as discussed below.

The key concerns preventing dogs in the workplace were focused on the perceived suitability of the working environment (Question 1). Concerns over the suitability of the building and environment may be easily rectified by developing a rota system so that a limited number of dogs are at work on any one day or by considering implementing a kennel/doggy crèche scheme. Indeed, organizations which have actively supported employees bringing their dogs to work have benefited from lower turnover rates and increased employee satisfaction and productivity (Griffin, 2003). Additionally, in contrast to concerns about the professional atmosphere affecting business, the presence of a dog may have a positive impact on retail businesses. Evidence shows that both interactive and non-interactive social presence can impact upon consumer buying (Argo, Dahl, & Manchanda, 2005), with the lack of social interactions being a significant contributing factor to preventing people from purchasing (Ahuja, Gupta, & Raman, 2003). Responses from the survey suggest that dogs in the workplace increase social interactions, and this is supported in the literature (McNicholas & Collis, 2000; Perrine & Wells, 2006). Although Perrine and Wells (2006) reported that offices with dogs were viewed as less professional, these judgements were made by college students who had presumably yet to enter into the world of employment. As such, there is little evidence to suggest that dogs reduce office professionalism.

Other commonly cited reasons for dogs not being allowed in the workplace were themed around health and safety of the working environment for the employees and the dogs. There is a lack of literature to support the belief that having dogs in the workplace increases health and safety risks, or impacts negatively on dog welfare (Norling, 2008). It appears that referring to "health and safety" may be a convenient umbrella term for not allowing dogs in the workplace. Given that few organizations have implemented policies which allow staff to bring their

dogs to work, the implementation of carefully designed policies may alleviate health and safety concerns. Interestingly, the prevalence of pet allergies is relatively low compared with other allergies. For instance, studies show that between 2.5% and 15% of the population are sensitive to dog allergens (Custovic et al., 2003; Plaschke et al., 1996; Ramadour et al., 2005). By comparison, a larger proportion of the population is sensitive to pollen (39%), but plants are rarely banned from the workplace. Indeed, most pet allergies are caused by sensitivity to cats (18%) rather than dogs (Worm et al., 2011). A dislike (or fear/phobia) of dogs was more commonly cited as a colleague-related concern for why dogs were not allowed in the workplace (17%). In light of this it is suggested that if businesses are considering developing policies allowing staff to bring their dogs to work, the policy should include a section on the recruitment process for new staff to ensure potential employees will be capable of working happily in an environment with dogs, and that dedicated dog and no-dog areas are clearly demarcated, akin to smoking areas. We have provided a graphical demonstration of how workplaces can assess their potential to incorporate dogs in the workplace, and provide suggestions to overcome the associated challenges and concerns (Figure 2).

Limitations and Future Research Suggestions

The survey was advertised through the "Take your dog to work" campaign which encourages dogs at work, therefore it may have attracted a biased sample of responders. This could explain why we received more positive comments than in previous studies (Norling & Keeling, 2010). Although the study gathered perceptions of dogs in the workplace, no objective measurements of workplace performance or employee health were taken to support them. Additionally, controlled investigations are needed to explore the impact of dogs in the office on work-based outcomes, absenteeism, tardiness, and job satisfaction. Such factors have yet to be objectively analyzed in companies who do and do not allow dogs in the workplace. Furthermore, research is needed to specify which organizations are most likely to benefit from having dogs in the workplace (e.g., consider nature of daily roles, office layouts, and shift patterns). It should also be pointed out that we did not ask about dog temperament; it is possible that some of the positive (e.g., calming influence) and negative effects (e.g., distraction) are related to specific aspects of the dog's temperament. Identifying these traits may be important in developing "bring your dog to work" policies across different organizations.

Conclusion

The results from this survey highlight that many people have positive perceptions of dogs in the workplace and it may be reasonable to challenge the perception that their presence is seen as unprofessional. A useful step would be for businesses to survey their clientele, rather than make assumptions about this. The improvements associated with dogs in the workplace identified in this study have been previously noted in both the AAI literature (as effects of animal companionship) and occupational psychology (as being important in determining successful working). This suggests that allowing dogs into offices could bring significant benefits to employee health and performance, thereby improving the productivity and economic efficiency of many businesses.

It appears that many of the negative perceptions of allowing dogs in office environments could be overcome by the development of appropriate policies. This identifies a key area in which business managers and executive officers should work with a multi-disciplinary team of animal behaviorists, veterinarians, and health and occupational psychologists to develop "bring

your dog to work" policies. We provide a graphical illustration of how businesses may begin to start designing policies within their company (Figure 2).

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Conflict of Interest

The authors declare no conflict of interests.

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Animal-assisted Social Skills Training for Children with Autism Spectrum Disorders

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ABSTRACT Recent research indicates that youth with autism spectrum disorder (ASD) show increases in prosocial behaviors in the presence of animals, yet few studies have examined the effects of incorporating animals into treatments. The current study evaluated the effectiveness of an animal-assisted social skills training group for youth with ASD. It was hypothesized that incorporating dogs into social skills training (SST) would produce a greater effect on improving social skills, theory of mind, and feelings of inclusion than would be obtained from SST without an animal present. We compared social skills groups with therapy dogs to traditional social skills groups without an animal present. Students with ASD attending school at a therapeutic treatment facility (n = 31; ages 8–14) were assigned to either experimental or control groups, which were both provided with 12 weeks of weekly treatment. Following participation in SST, participants in the groups with dogs were rated as significantly less symptomatic than participants in the traditional social skills group on the Social Responsiveness Scale (SRS-2), a teacher-rated measure of autism-related symptoms. Based on self-report ratings using the Children's Depression Inventory (CDI-2), participants in the groups with dogs experienced significantly greater reductions in symptoms measured by the Interpersonal Problems and Functional Problems subscales, and not on the other subscales of the CDI-2. Both groups showed improvement in theory of mind and decreased feelings of isolation and overall depressive symptoms; however, the effect of group on change over time was not significant. On the Social Language Development Test (SLDT), no significant differences were observed. The current findings indicate animal-assisted social skills training may be more beneficial for improving social skills and reducing related affective symptoms than traditional training models.

Keywords: animal-assisted, autism, dog, social skills, therapy

Children with autism spectrum disorder (ASD) present with persistent social communication deficits across multiple settings (5th ed.; DSM–5; American Psychiatric Association [APA], 2013).

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Delays in social communication skills influence the development of social relationships with peers and adults, and contribute to limited and less reciprocal friendships in comparison with typically developing peers (Chamberlain, Kasari, & Rotheram-Fuller, 2007). In addition to having an impact on social functioning, social communication deficits have been associated with increased feelings of isolation and internalizing problems in children with ASD, including symptoms of depression and anxiety (Krasny, Williams, Provencal, & Ozonoff, 2003; Russell & Sofronoff, 2005). A growing body of research suggests that children with ASD show improved social functioning during interactions with animals (Nimer & Lundahl, 2007). While in the presence of an animal, children with ASD have been found to approach and interact with others significantly more frequently than without an animal present (Prothmann, Ettrich, & Prothmann, 2009). Working with animals may also help children understand their own and others' mental states (Melson, 2001), a skill that is characteristically underdeveloped in children with ASD. Given preliminary evidence that animal interactions promote various social skills, there is a need to investigate whether animal interactions can be used to improve the effectiveness of social skills training programs.

Social Communication in Individuals with ASD

The DSM-5 describes the core features of ASD as persistent deficits in social communication and the presence of restricted, repetitive patterns of behavior, interests, or activities (APA, 2013). Symptoms may include difficulty initiating or sustaining social interactions, atypical eye contact, limited use of gestures, and difficulty maintaining relationships. Symptom severity and presentation can range greatly between individuals, with language ability, IQ, age, and exposure to interventions all thought to contribute to the manifestation of the disorder (Mayes & Calhoun, 2011; Volden, Coolican, Garon, White, & Bryson, 2009). High-functioning individuals with ASD may possess age-expected cognitive skills and the ability to speak in complete sentences (Joseph, Tager-Flusberg, & Lord, 2002), yet exhibit impairments in the ability to accurately read facial expressions, interpret social cues, and perceive the thoughts and feelings of others (Adams, Green, Gilchrest, & Cox, 2002; Church, Alisanski, & Amanullah, 2000; Downs & Smith, 2004). Many individuals with ASD also show reduced interest in social interactions or may attempt to initiate friendships in a manner that is perceived as odd (Geschwind & Levitt, 2007).

Deficits in social communication have been associated with a range of outcomes for youth with ASD, including social isolation, difficulty forming relationships, low self-esteem, depression, and anxiety disorders (Krasny et al., 2003; Russell, & Sofronoff, 2005). Children with high-functioning ASD have been found to experience symptoms of depression and anxiety at a greater rate than the general population and they are at greater risk for developing mood and anxiety problems than typically functioning children (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000). Not surprisingly, social communication delays have also been associated with increased peer conflicts, reduced number of friendships, and school absences (Lee, Harrington, Louie, & Newschaffer, 2008; Orsmond, Krauss, & Seltzer, 2004).

Treatment for Social Communication Deficits ASD

Given the impact of social impairments on the functioning of individuals with ASD, it is suggested that all children with ASD may benefit from social skills training (SST) programs (Bellini & Peters, 2008). Group-based SST programs are a logical intervention format because they promote interaction with other children and provide opportunities to use newly learned skills in a relatively realistic setting (Barry et al., 2003; White, Keonig, & Scahill, 2007). While overall SST treatment goals vary (Rao, Beidel, & Murray, 2008), most relate to multiple aspects

of social development. Common treatment goals include increasing social motivation, play skills, conflict management strategies, social cognition (e.g., theory of mind, problem solving, and emotion regulation), and the understanding of emotions in one's self and others (Baker, 2003; Bareket, 2006; Weitlauf et al., 2014). Skills are typically taught with the use of behavioral and social learning techniques (Cooper, Griffith, & Filer, 1999; McConnell, 2002), and scheduled practice opportunities (Cappadocia & Weiss, 2011). Research has shown that following participation in SST groups, children with ASD perform better on theory of mind tasks (Bauminger, 2007); earn significantly higher scores on facial recognition tasks (Solomon, Goodlin-Jones, & Anders, 2004); and are rated as significantly higher functioning on standardized social skills scales by parents and teachers (Lopata, Thomeer, Volker, Nida, & Lee, 2008; Tse, Strulovitch, Tagalakis, Meng, & Fombonne, 2007). Social skills training models vary and may be implemented individually, in groups, and with or without parent training (Weitlauf et al., 2014). With regard to the length, frequency, and duration of SST programs, a review by Cappadocia and Weiss (2011) found that SST programs tend to range in duration from 8 to 13 sessions provided across 6.5 to 12 weeks, with the total number of intervention hours ranging from 8–18 hours. The results of previous studies on the effectiveness of social skills training provide preliminary evidence that children with autism can acquire specific social skills with direct training. However, since social and communication deficits are a source of functional impairment for children with autism, there is a need for research and development in order to improve upon existing programs.

Animal-assisted Interventions

Animals have been described as social catalysts, whose presence positively influences interactions between people (McNicholas & Collis, 2006). Of note is research showing that children with ASD engage in more frequent and longer social interactions while in the presence of an animal compared with people or toys (Prothmann, Ettrich, & Prothmann, 2009). The ability of animals to act as social catalysts is supported in a recent study comparing small-group interactions between school-age children while in the presence of a guinea pigs versus toys (O'Haire, McKenzie, Beck, & Slaughter, 2013). In the guinea pig condition, children with ASD showed significantly more social approach behaviors toward typically developing peers. Typically developing peers also showed significantly more social approach behaviors directed toward students with ASD. In the same study, children with ASD exhibited significantly increased eye-contact and positive affect (e.g., smiling, laughing); and significantly decreased negative affect in the guinea pig condition.

The finding of an increase in positive social behaviors is consistent with other evidence that the presence of an animal seems to influence the quality of social behaviors in children with ASD. Children with ASD have been found to use significantly more language in occupational therapy sessions that incorporate animals versus sessions without animals (Sams, Fortney, & Willenbring, 2006), and show more smiling and social engagement in therapy sessions that include a dog versus a stuffed dog or toy (Martin & Farnum, 2002; Silva, Correia, Lima, Magalhaes, & de Sousa, 2011). In order to increase measurement accuracy, Funahashi, Gruebler, Aoki, Kadone, and Suzuki (2014) assessed smiling and social behaviors in a child with ASD using an electromyography device and video recording during sessions with a dog, therapist, and parent. When comparing the first session to the fourth session, the authors found a 3-fold increase in positive social behaviors (e.g., smiling, watching the dog, verbal communication with the dog/others) and notable decreases in negative behaviors (e.g., anger,

anxiety, escaping). These studies indicate that animal-assisted interventions (AAIs) may be helpful for promoting initiation of social interactions and maintenance of interactions using both verbal and nonverbal communication, which are two key deficits associated with ASD.

The stress-reducing effects of AAIs also contribute to their appeal for youth with ASD, who often exhibit social anxiety and avoid social situations (Kuusiko et al., 2008). The non-judgmental social support offered by animals is frequently highlighted as a unique benefit of AAIs (Friesen, 2009). In the capacity of offering social support and stress reduction, therapy animals have been included in reading remediation programs (Briggs Newlin, 2003), court proceedings (Ng, 2011), and interventions for emotionally dysregulated children with developmental disabilities (Greene, 2012).

It is possible that increases in prosocial behaviors during human–animal interactions are due to favorable physiological changes that occur in the participants. Studies show that interactions with animals can affect a variety of physiological processes related to stress reduction, including decreased heart rate (Polheber & Matchock, 2014) and cortisol levels (Beetz et al., 2011). Research on physiological changes in children with ASD is scarce, however Viau et al. (2011) showed that children with ASD show significantly reduced waking cortisol levels following the introduction of a service dog into the home, and subsequent increases in cortisol levels after removal of the dog.

With regard to non-ASD populations, Beetz and colleagues (2012) proposed that some of the beneficial effects of human–animal interactions, such as enhanced empathy and social attention, might be attributable to the release of oxytocin, a hormone associated with social bonding. They suggested that biological processes involved in social bonding between humans are similar to those that occur between humans and dogs. Preliminary data support the role of oxytocin in observed effects of animal interactions. Odendaal (2000) found significant increases in oxytocin in adults who interacted with a dog versus adults who read quietly. Similarly, significant increases in oxytocin were found in a group of women interacting with their own dogs compared with a control group (Handlin et al., 2011).

In our study, we implemented and evaluated an animal-assisted social skills intervention with dogs for children with high functioning ASD. We hypothesized that participants would improve their ability to connect and interact with others through work with animals in a structured therapeutic format. We expected that incorporating dogs into the intervention would produce a greater effect on social skills, perspective taking, theory of mind, and feelings of isolation than can be obtained from conventional social skills training, after the program is completed.

Our study tested the following three hypotheses: 1) Participants in the animal-assisted social skills groups would show improvements in social skills, as measured by significant differences in scores on the Social Language Development Test, (subtests A and D) and the Social Responsiveness Scale, Second Edition (SRS-2). Further, the change in SRS-2 and SLDT subtest scores in the animal-assisted therapy group would be significantly greater than the change in scores in the traditional social skills group; 2) Participants in the animal-assisted social skills groups would show improvements in theory of mind, or the ability to infer the mental state of others, as measured by significant change in scores on the Reading the Mind in the Eyes Task (RMET). Further, changes in RMET scores would be significantly greater in the animal-assisted therapy group compared with the traditional social skills group; and 3) Participants in the animal-assisted social skills groups would show a decrease in maladaptive internalizing and externalizing behaviors, including feelings of

isolation and depressive symptoms, as measured by negative change scores on the Children's Depression Inventory 2nd Edition (CDI-2). Further, changes in CDI-2 scores would be significantly greater in the animal-assisted therapy group compared with the standard social skills group.

Methods

Participants

Participants were recruited from a special education Therapeutic Day Program (TDP) and Residential Treatment Center (RTC). All students with a parent-reported history of ASD, Autistic Disorder, Asperger's Disorder, or Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) were invited to participate. Inclusion criteria for participants included a previous diagnosis and adequate language skills for participation in activities, specifically fluent verbal skills. An allergy to dogs, intellectual disability (IQ below 70), and severe language disorder were exclusionary criteria for the study. Thirty-two students were recruited and met inclusion criteria. One student moved during the study and was removed. The majority of the participants were boys (28 boys and 3 girls), which reflected the school's demographics. They ranged in age from 8–14 years old (M = 10.97; SD = 1.84). Parental consent and participant assent were obtained prior to data collection.

Procedure

Participants were assigned to either the experimental or control conditions based on scheduling availability. Each condition had one group of children ages 8–10 and one group ages 11–14. There were 7–8 children in each group. All groups met for one hour each week over 12 weeks.

The study utilized a between-within repeated measures design. Within two weeks before and after the 12-week trial, participants were individually administered assessments of depressive symptoms, theory of mind ability, and social skills. All assessments measured at pre-test were administered by graduate students in psychology who were blind to participants' assigned conditions. All assessment questions were read to each child in order to minimize the influence of any reading difficulties. After the final group, participants' classroom teachers completed a rating scale of social behaviors associated with ASD symptoms designed as a teacher rating scale (SRS-2). Due to scheduling and other logistical reasons, it was necessary to begin the study at the end of the school year. One challenge associated with the timing of the start date was that teachers were occupied with end-of-year events and the high volume of documentation that is required for assessing and grading students with special needs. Although it would have been ideal to collect teacher reports prior to the interventions, it was not possible to do so given that teachers experienced time constraints related to end-of-year demands. Despite having made several follow up attempts in person, by email, and by phone, the investigators were unable to collect adequate pretest data for the teacher-rated SRS-2. Teachers were not informed of group assignments; however, the researchers could not control for participant disclosure to teachers on a daily basis. All other post-test assessments were completed by the same psychology graduate students as during the pre-test.

The SST groups were co-facilitated by two professional therapists, with graduate degrees in psychology or social work. All therapists were experienced in working with children with ASD. The study therapists were trained by the PI and co-investigators and worked in pairs to

run one experimental group and one control group. In the experimental condition, two handler/therapeutic dog teams were integrated into each group.

The curriculum's format and content were modeled after published social skills curricula for children with ASD, and included sessions about getting acquainted, making friends and conversation, play skills, empathy, self-regulation, and conflict management (Baker, 2003; Bareket, 2006). All groups had the same target skill each week and followed the same schedule, including: a) review of previous skills, b) an introduction to the session goal and activity, c) modeling and practice, and d) a review of the target skill. Consistent with reviews of previous SST groups, a host of teaching techniques were used, including direct instruction, modeling, role-playing, shaping, feedback, and reinforcement of positive interactions (Cappadocia & Weiss, 2011). See Table 1 for an overview of the curriculum by session.

In the experimental condition, participants' interactions with the dogs varied based on the stage of the session and the session's target skill. During the greeting and "good bye" stages, each child had the chance to pet the dog individually. After the participants greeted the dogs, they observed one of the study therapists and dog/handler teams demonstrated the activity. For the activity, the children were split into small work groups comprised of one therapist, four children, and one dog/handler team. Activities included having the children co-lead a dog with the handler (i.e., using two leashes so both handler and child held leash), practice asking dogs to perform basic commands, practice grooming, and practice appropriate ways to approach and engage dogs. In the final review stage, the AAI group met as a whole and the session goals were reviewed by asking children to either verbalize or demonstrate the skill to the group.

Both groups used activities adapted from manual-based social skills training curriculums for youth with ASD (Coucouvanis, 2005; Gutstein & Sheely, 2002). The traditional session goals aligned exactly with animal sessions, and whenever possible, the session content mirrored the animal sessions. For example, both groups did an activity with Lego® to work on shifting between social roles of leader and follower. An effort was made to incorporate a similar level of movement and hands-on activity in the traditional groups as was included in the groups with dogs.

Attempts were made to control the confounding variables of therapist, handler/dog team, session content, and setting. Each pair of therapists ran one experimental group and one control group to minimize the influence of therapist skill or style on the intervention. The locations of the groups were the same across groups to remove the influence of the setting. The inclusion of multiple handler/dog teams reduced the influence of a particular dog, which is important for eliminating the possibility that significant results could be attributed to the appeal of an individual dog (Kazdin, 2011). The session content was also manualized and largely scripted, in order to achieve consistency across groups. Therapists met with investigators ahead of time in order to reinforce adherence to manual.

Multiple measures were taken to ensure that the children and dogs interacted safely. The sessions were modeled after the EAGALA model of equine-assisted therapy, in which one individual is primarily responsible for handling the animal's needs and another individual is primarily responsible for providing the therapeutic intervention (Equine Assisted Growth and Learning Association, Inc., 2006). The structure of including a clinician and an additional individual responsible for monitoring the well-being of the animal has also been referred to as the diamond model (Brooks, 2006). As part of the model, the clinicians were actively engaged in ongoing communication with both the handlers and children to ensure that all

Table 1. Social skills curriculum objectives and goals for both groups.

Module I: Identifying the Intentions of Others/Theory of Mind
UNIT 1
Objective: Learning and decoding non-verbal cues
Session 1
Measurable Goal: Child will be able to observe and identify body language, listen, attend, and observe the behaviors of others.
Session 2
Measurable Goal: Child will be able to link nonverbal cues to emotions and understand what emotions look like.
UNIT 2
Objective: Using nonverbal cues in order to infer another's informational state
Session 3
Measurable Goal: Child will be able to apply basic theory of mind to infer another's informational and emotional state.
Module II: Strategies for Effective Social Interaction
UNIT 3
Objective: Developing pragmatic skills
Session 4
Measurable Goal: Child will initiate communication through using key words like "look" and "help."
Session 5
Measurable Goal: Child will be able to vary register, tone and volume, in appropriate ways as well as vary personal space appropriate to situation.
Session 6
Measureable Goal: Child will be able to identify different relationship and implement pragmatic skills appropriate to situation and role (ex: leader, follower, playmate).
Session 7
Measurable Goal: Child will be able to use narration in order to discuss a given topic. Child will be able to listen to another person and make on-topic comments.
Session 8
Measurable Goal: Child will be able to discuss a range of topics and terminate one topic to switch to a different subject.
UNIT 4
Objective: Cooperative Play
Session 9
Measurable Goal: Child will be able to carry out goal-oriented activities with peers and understand how to work together.
Session 10
Measurable Goal: Child will be able to take turns without prompting.
Session 11
Measurable Goal: Child will be able to ask someone to play and effectively engage with a peer.
Session 12
Measurable Goal: Child will be able to manage frustration through self-regulation in play and in turn taking.

participants felt comfortable engaging in the activities. The handler–dog teams were previously certified through Pet Partners, The Good Dog Foundation, or Therapy Dogs International. Therapy dog certifications from each of the aforementioned organizations require that handler–dog teams pass a series of tests designed to assess the handler's leadership of the team and ability to monitor the dog's needs, as well as the dog's temperament and suitability for therapy work. They also require that dogs have health and fitness documentation from veterinarians. Children were provided with explicit guidelines for appropriate interactions with the dogs (i.e., use gentle hands, use indoor voices), which were reviewed at the start of each session. The handlers monitored the dogs closely for signs of distress and a safety procedure was created to be used in the event that children exhibited overly loud or unpredictable behaviors.

This study was reviewed and approved by the Green Chimneys Institutional Review Board (IRB). The IRB is made up of experts in both the ethical treatment of animals as well as the ethical treatment of humans; thus, it also served as an equivalent to an Institutional Animal Care and Use Committee (IACUC) review.

Instruments

Childhood Autism Rating Scale-Second Edition (CARS-2): In order to assess ASD symptom severity in participants, mental health clinicians treating each child with individual therapy were asked to complete the Childhood Autism Rating Scale, Second Edition (CARS-2). The CARS-2 is a brief rating scale that is widely used in the identification of ASD symptoms. Based on the behavior ratings of trained observers, it offers symptom ratings on 15 dimensions or symptoms of autism; an internal reliability coefficient of 0.93 has been reported for this measure (Schopler, Van Bourgondien, Wellman, & Love, 2010).

Children's Depression Inventory-Second Edition (CDI-2): The Children's Depression Inventory–Second Edition (CDI-2) is a 28-item, self-report questionnaire used to assess cognitive, affective, and behavioral symptoms of depression. On each item, children are asked to choose from one of three statements that best describe their feelings over the previous two weeks. The CDI-2 assesses emotional and functional problems associated with depression. It provides an overall score as well as individual subscale scores in the areas of negative mood/physical problems, negative self-esteem, ineffectiveness, and interpersonal problems (Kovacs & MHS Staff, 2011). This test is suitable for children ages 6–17. Test-retest reliability showed short-term stability with nearly no change during a time period of 2–4 week intervals, and CDI-2 forms showed acceptable levels of internal consistency, with Cronbach's alpha values from 0.67 to 0.91 for total and subscales for all age and sex groups (Bae, 2012). The CDI-2 has been used to assess symptoms of depression in children and adolescents with ASD (Wijnhoven, Creemers, Engels, & Granic, 2015).

Reading the Mind in the Eyes Test (RMET): The Reading the Mind in the Eyes Test (RMET) evaluates one's ability to infer another person's mental state from a photograph of only their eye region (Baron-Cohen, Wheelwright, Hill, Raste, & Plum, 2001; Vrouva, Target, & Ensink, 2012). It is used to assess children's implicit nonlinguistic theory of mind. The RMET consists of a series of 28 images of eyes depicting emotion states, with a forced choice between four mental-state terms for each. Baron-Cohen and colleagues found that adults with Asperger's syndrome or high-functioning autism showed significant impairment on the RMET as compared with a typical sample group; whereas they found no group differences on gender

recognition control tests. Hallerbäck and colleagues (2009) examined the test-retest reliability of the RMET and found mean differences for all subjects of 0.33, with standard deviation 2.16. There was also no indication of learning effects when the test was repeated.

Social Language Development Test (SLDT), Making Inferences and Supporting Peers Subtests: The Social Language Development Test (SLDT) is a standardized measure of verbal and nonverbal social language skills. Results of normative analyses conducted on the SLDT indicate that it significantly discriminates between children with ASD and children with typically developing language abilities (Bowers, Huisingh, & LoGiudize, 2008). Subtest A, "Making Inferences," assesses a student's ability to accurately make inferences about another person's thoughts and feeling state using cues, such as facial expression. Subtest D, "Supporting Peers," measures the ability to identify and take the perspective of a friend or individual based on scenarios presented in narrative form. According to Bowers, Huisingh, and LoGuidize (2008), the test-retest coefficient is 0.79 for the total test, the SEM is 11.26 for the total test, and the KR20 coefficient is 0.93. The mean test-retest reliability coefficients were reported as $r = 0.63$ for "Making Inferences," and $r = 0.75$ for "Supporting Peers" (Bowers, Huisingh, & LoGiudize, 2008).

Social Responsiveness Scale-Second Edition (SRS-2): Classroom teachers completed the SRS-2 "Teacher Report" following the 12 sessions, to measure differences in social competence. The SRS-2 is a 65-item, standardized measure of children's social competence, where social deficits are rated on a 4-point Likert scale. The SRS-2 "Teacher Report" measures the severity of the social impairments related to ASD as observed by the child's teacher. Social impairments assessed include social awareness, social information processing, the capacity for reciprocal social communication, social anxiety/avoidance, and autistic preoccupations and traits. The SRS-2 manual reports internal consistency (Cronbach's alpha) for the total score for boys as 0.93, and test–retest reliability as 0.85, with a 17-month period between testing (Constantino & Gruber, 2005).

Data Analysis

Data were entered into Statistical Package for the Social Sciences (SPSS) for analysis. An independent-samples *t*-test was used to determine if there were differences between the experimental group and the control group in teacher reported SRS-2 scores at the conclusion of the study. Repeated-measures mixed ANOVAs were used to examine change over time as a function of treatment condition on the SLDT, CDI-2, and RMET. Assumptions testing was carried out for each analysis and boxplots were used to asses for outliers in the data. Cohen's *d* values were used as measures of effect size.

Results

Sample Characteristics

A total of 31 youth with a previous diagnosis of ASD or related spectrum disorder participated in the study. Participants ranged in age from 8–14 years. One student was not available at the time of pre-testing and was therefore not included in the self-report data. Demographic information regarding sex, age, IQ, and diagnosis of each participant was collected through review of records. The mean IQ for the sample was in the average range. There was a response rate of 80% for the Childhood Autism Rating Scale-Second Edition (CARS-2) surveys, and all participants met criteria for at least mild to moderate symptoms of autism spectrum disorder.

There were no significant differences between groups with respect to age, IQ, or ASD symptom severity on the CARS-2 (see Table 2).

Table 2. Analysis of demographic variables by treatment.

	Social Skills Group with Dog			Traditional Social Skills Group			
Group	***n***	***M***	***SD***	***n***	***M***	***SD***	***p***
Age	17	10	1.7	14	12	1.6	0.06
Full Scale IQ	16	90	13.9	13	89	15.0	0.96
Verbal IQ	17	92	15.6	14	90	12.4	0.77
Performance IQ	17	97	13.9	14	92	18.3	0.39
Total CARS-2	11	53	10.1	14	51	9.5	0.52

CARS-2: Childhood Autism Rating Scale-Second Edition.

Teacher-Reported Social Skills Ratings

An independent-samples *t*-test was used to determine if there were differences between the experimental group and the control group in teacher reported SRS-2 scores at the conclusion of the study. Inspection of boxplots revealed one outlier in the Restricted Interests and Repetitive Behaviors (RRB) data. Scores for each level of condition were normally distributed and there was homogeneity of variances. The outlier did not impact homogeneity of variance and thus it was included in the analysis. Symptom severity was significantly higher in the control group than in the experimental group, as measured by total SRS-2 scores ($t_{(26)} = 3.98$, $p < 0.001$), and on composite scales measuring overall social interactions, as well as restricted behaviors (see Table 3).

Table 3. Effects of condition on Social Responsiveness Scale-Second Edition (SRS-2).

	Social Skills Group with Dog			Traditional Social Skills Group						
	n	***M***	***SD***	***n***	***M***	***SD***	***t***	***df***	***p***	***d***
Social Responsiveness Scale										
Total	14	59	9.4	14	73	9.2	3.98	26	< 0.001	1.50
SCI	14	58	8.9	14	71	9.3	3.63	26	0.001	1.43
RRB	14	60	11.7	14	77	9.1	4.20	25	< 0.001	1.66

SCI = Social Communication and Interaction; RRB = Restricted Interests and Repetitive Behaviors.

Participant Assessments

Repeated-measures mixed ANOVAs were used to compare participants' scores from pre- to posttest, as well as group differences for the CDI-2 Total scores and subscale scores, the RMET, and the SLDT, Subtests A and D. The means and standard deviations of the scores for the CDI-2, RMET, and SLDT by group can be found in Table 4.

Children's Depression Inventory-Second Edition (CDI-2): Assumptions testing for the CDI-2 Total score, and the Emotional Problems, Negative Mood/Physical Symptoms and Negative Self-Esteem subscales revealed that there were no outliers in the data, as assessed by inspection of a boxplot. On the Functional Problems, Ineffectiveness and

Table 4. Outcome measure descriptive statistics by group.

		Pretest		Posttest	
Measure	***n***	***M***	***SD***	***M***	***SD***
CDI-2					
Total					
Group with dog	16	65	13.7	58	10.6
TSS Group	14	60	7.6	57	8.8
Total	30	63	11.4	56	9.6
Ineffectiveness					
Group with dog	15	62	14.9	54	9.9
TSS Group	14	57	10.8	54	8.3
Total	29	60	13.1	53	9.0
Functional Problems					
Group with dog	15	66	14.9	54	9.5
TSS Group	14	60	10.4	57	9.3
Total	29	63	13.1	55	9.3
Negative Mood/ Physical Symptoms					
Group with dog	16	64	15.2	60	12.0
TSS Group	14	53	8.5	48	6.0
Total	30	62	13.7	60	11.4
Negative Self-Esteem					
Group with dog	16	60	14.1	50	6.5
TSS Group	14	53	8.5	48	6.0
Total	30	57	12.2	49	6.2
Emotional Problems					
Group with dog	16	64	14.0	57	9.8
TSS Group	14	58	8.9	56	8.8
Total	30	61	12.1	56	9.2
Interpersonal Problems					
Group with dog	15	66	16.7	53	11.9
TSS Group	14	60	12.4	60	13.8
Total	29	63	14.8	57	13.2
RMET					
Group with dog	16	15	4.6	17	6.0
TSS Group	14	15	2.4	17	2.0
Total	30	15	3.7	17	4.7
SLDT					
Making Inferences					
Group with dog	15	14	5.6	12	4.5
TSS Group	14	13	5.0	12	7.0
Total	29	13	5.0	12	5.5
Supporting Peers					
Group with dog	16	27	10.5	27	12.4
TSS Group	14	31	8.1	26	10.0
Total	30	29	9.5	27	11.3

CDI-2 = Children's Depression Inventory-Second Edition; TSS Group = Traditional Social Skills Group; RMET = Reading the Mind in the Eyes Test; SLDT = Social Language Development Test.

Table 5. Mixed ANOVA results: Effect of time and condition on variables.

Variable	*df*	*f*	*p*	η_p^2
CDI-2				
Total				
Time	(1, 28)	6.35	0.02	0.19
Time x Group	(1, 28)	1.51	0.23	0.05
Ineffectiveness				
Time	(1, 27)	7.52	0.01	0.22
Time x Group	(1, 27)	1.23	0.28	0.04
Functional Problems				
Time	(1, 27)	15.79	< 0.001	0.37
Time x Group	(1, 27)	4.42	0.045	0.14
Negative Mood/Physical Symptoms				
Time	(1, 28)	0.38	0.54	0.01
Time x Group	(1, 28)	0.52	0.48	0.02
Negative Self-Esteem				
Time	(1, 28)	8.00	< 0.01	0.22
Time x Group	(1, 28)	1.49	0.23	0.05
Emotional Problems				
Time	(1, 28)	4.36	0.046	0.13
Time x Group	(1, 28)	1.22	0.28	0.04
Interpersonal Problems				
Time	(1, 27)	7.51	0.01	0.22
Time x Group	(1, 27)	8.73	< 0.01	0.24
RMET				
Time	(1, 28)	7.21	0.01	0.21
Time x Group	(1, 28)	0.001	0.98	< 0.001
SLDT				
Making Inferences				
Time	(1, 27)	1.43	0.24	0.05
Time x Group	(1, 27)	0.3	0.86	0.001
Supporting Peers				
Time	(1, 28)	1.12	0.30	0.04
Time x Group	(1, 28)	1.67	0.21	0.06

CDI-2: Children's Depression Inventory-Second Edition; TSS Group = Traditional Social Skills Group; RMET = Reading the Mind in the Eyes Test; SLDT = Social Language Development Test.

Interpersonal Problems subscales, one outlier falling over two standard deviations above the mean was identified from each subscale and removed from the analyses. All three outliers were self-rating scores belonging to one student. A review of the examiner's notes indicated that the student was described as unusually agitated and upset over a family issue during testing. Given these observations, the student's ratings were not considered a valid estimate of his symptom level at the time of assessment. Following removal of outliers, the CDI-2 Total and all subscale scores were normally distributed and there was homogeneity of variances.

There was a significant time-by-group interaction on the Interpersonal Problems subscale ($F_{(1, 27)} = 8.73$, $p < 0.01$) and the Functional Problems subscale ($F_{(1, 27)} = 4.42$, $p = 0.045$). While both groups improved over time, participants in the experimental group showed significantly more improvement on these scales than participants in the control

η_p^2

group. Change over time was significant for the CDI-2 Total score ($F_{(1,27)} = 6.35$, $p = 0.02$), and on subscales measuring feelings of self-worth ($F_{(1, 28)} = 8.00$, $p < 0.01$) and effectiveness ($F_{(1, 27)} = 7.52$, $p = 0.01$). See Table 4 for full results.

Reading the Mind in the Eyes Task (RMET): There were no outliers in the data, as assessed by inspection of a boxplot. Scores were normally distributed and there was homogeneity of variances. Significant results were found for the effect of time on performance on the RMET ($F_{(1, 28)} = 7.21$, $p = 0.01$). However, no between group differences were found ($F_{(1, 28)} = 0.001$, $p = 0.98$).

Social Language Development Test (SLDT), Subtests A and D: The scores were normally distributed, as assessed by inspection of a boxplot, and there was homogeneity of variances. No significant differences were found for performance on the SLDT subtests A or D for the effects of time or condition (see Table 5).

Discussion

The purpose of our study was to examine the effectiveness of an animal-assisted social skills intervention for children with high functioning autism spectrum disorder. We compared the effectiveness of an animal-assisted social skills training program with dogs with a traditional social skills training program without the inclusion of dogs. We hypothesized that social skills training would have a significant effect on participants' social communication skills, ability to understand another's thoughts and feelings, sense of isolation, and depressive symptoms. We further predicted that these changes would be significantly greater in the animal-assisted training group than in the control group. We found significant group differences in both teacher ratings of social behavior and self-report ratings of interpersonal problems, which support the hypothesis that the inclusion of dogs in social skills training is more effective than traditional programs. Since the experimental group and the control group were found to be similar on factors related to severity of ASD, including age, IQ, and ASD symptom ratings on the CARS-2, it is likely that group differences are attributable to the effects of the intervention.

Teachers were asked to rate the participants' severity of social skills deficits based on characteristic symptoms of ASD using the SRS-2. Teacher ratings showed that compared with the control group, participants who received the animal-assisted social skills intervention exhibited fewer social skills deficits overall, fewer restricted and repetitive behaviors, and more typical social communication following the intervention. Differences in SRS-2 ratings are notable because they reflect differences in behaviors that were explicitly targeted in the interventions, such as playing appropriately with other children, making eye contact, and initiating interactions with peers.

In light of research showing high levels of comorbid depression and social isolation in youth with ASD, we asked participants to rate their symptoms of depression using the CDI-2 before and after the intervention. After the intervention, both groups reported significant decreases in depressive symptoms on all of the CDI-2 scales, except Negative Mood/Physical Symptoms. The improvements measured on the CDI-2 support previous research showing that children's depressive symptoms tend to decrease as their social skills increase (Kim et al., 2000; Krasny et al., 2003). Further analyses showed a significant interaction between condition and time on the Functional Problems composite scale and the Interpersonal Problems subscale, such that participants in the animal-assisted social skills training rated themselves as having significantly fewer symptoms than those in the control group. Items on these scales assess problems with peers, feelings of ineffectiveness, social isolation, and feelings of worth within the family structure.

To date, few studies have examined the effect of social skills training on affective symptoms, such as depression. One such study found that youth with ASD showed a significant reduction in symptoms of loneliness following a parent-assisted social skills intervention (Frankel et al., 2010). Our results suggest that youth with ASD are likely to show reductions in depression following explicit instruction in social behaviors and opportunities for practice. Further, incorporating dogs into social skills training programs appears to significantly reduce specific symptoms of depression, including feelings of isolation and ineffectiveness in social interactions.

It is likely that the observed positive effects of including dogs in social skills training are at least in part attributable to the influence of dogs on participants' affective or emotional states. We suggest that participants were more engaged in learning and practicing social skills in the experimental group because the dogs helped to make social interactions more enjoyable and pleasant, thus reinforcing social engagement. Traditionally, interventions for ASD have been largely behavioral and have not focused on children's motivation, interests, or emotional states (Weitlauf et al., 2014). However, there is growing evidence that interventions for youth with ASD are more effective when they incorporate activities that motivate and meet the emotional needs of the participants (Dunst, Trivette, & Hamby, 2012; Rogers & Dawson, 2010). Previous researchers have noted that human–animal interactions seem to motivate youth with ASD to engage in social behaviors (Martin & Farnum, 2002; Sams, Fortney, & Willenbring, 2006). In our study, therapists provided anecdotal observations of increased motivation seen in participants in the experimental group. Youth in the experimental group tended to initiate conversations about the groups with study therapists in between sessions and after the study had concluded, while those in the traditional groups did not. The participants asked questions like, "When do we have dog group again?" and "Is (therapy dog) coming back?" Although such inquiries were unexpected and not measured empirically, they suggest that youth in the experimental group experienced more interest and motivation to be involved in social skills training with dogs than their peers in the traditional groups.

Regardless of condition, participants in both groups showed improvement in their ability to understand what another person may be thinking or feeling, as measured by the RMET. The increase in RMET scores shows that children with ASD benefited similarly from theory of mind training with dogs as with people. In other words, children with ASD improved their ability to conceptualize the thoughts and feelings of others to a similar degree whether they practiced taking the perspective of a human or of a dog and human in social skills training.

Results of the SLDT did not show any significant improvements in performance over time or between groups. The two SLDT subtests included in the study assessed participants' ability to make inferences about a person's thoughts and intentions based on a picture, and to provide examples of social support in response to fictional scenarios. The average posttest scores earned by participants in both groups were approximately equivalent to average scores earned by typically developing 7–8-year-old children in the test standardization sample (Bowers, Huisingh, & LoGiudize, 2008). These results highlight that although significant social skills improvements were found on the SRS-2, participants continue to show delays in social development when compared with typically developing peers. The results of the Making Inferences test are particularly notable since the test has similar demands to the RMET, on which participants in both social skills groups showed significant improvement. Like the RMET, Making Inferences required participants to detect nonverbal cues based on a picture of a person. While the RMET asked participants to identify the emotional state of pictured individuals' faces, Making Inferences required participants to take the perspective of the

pictured individual and express the person's thought based on the context. The RMET results imply that the social skills training was effective in helping participants develop the early skills necessary to recognize the mindset of another person; however, the SLDT results show that more intervention is needed to expand those skills so participants can manage increasingly complex social demands.

The SLDT results point to a limitation of this study, which is that the frequency and duration of treatment may not have been sufficient to produce change in complex social behaviors. Although many social skills training programs use a similar treatment schedule, Odom, Boyd, Hall, and Hume (2010) advocate for the use of more intensive and/or longer interventions. A second limitation is that in cases where both groups showed significant growth over time, it is not possible to know whether the effects were attributable to the interventions, maturation, or another factor.

One factor that was not assessed in this study, and is frequently overlooked in similar research (Prothmann, Ettrich, & Prothmann, 2009), is the impact of animal sessions on the dogs and the handlers. After the first few weeks of groups, the handlers began observing that their dogs showed increased excitement when they arrived on campus. The dogs seemed motivated to interact with the children. The handlers also expressed that they enjoyed groups, specifically watching their dog participate in activities. Several factors likely contributed to the inviting environment. These factors include the careful planning that went into recruiting dogs with suitable temperaments and training, making sure that handlers had a quiet place to bring the dogs if needed, and the weekly review of appropriate animal interactions. In fact, there was only one instance in which a handler felt that she needed to give her dog a break during a session. With the expansion of animal-assisted therapies, it is important to have standardized procedures for assessing animals' comfort levels and to gain information about the types of activities that are most pleasing for the handler/dog teams that play a critical role in the treatments (Burrows, Adams, & Millman, 2008).

The current study is one of a few recent studies on the effectiveness of AAIs for developing social skills in children with ASD. As the scope of research on the use of AAIs for social skills expands, it will be useful to consider how the different species of animals included may influence the interventions. Although a comprehensive comparison of the benefits and challenges of including each animal is beyond the scope of this paper, it is possible to compare the features of the current model with dogs with other AAI models for social skills training, such as those with horses and guinea pigs. Three key factors can be considered in comparing models with different animals: cost, ease of implementation, and the features of the human–animal interaction. Cost and ease of implementation are vital considerations, since unaffordability and extensive implementation needs, like securing trained personnel and suitable animals, can be barriers to implementation.

While research on equine-assisted therapy has indicated that it can be effective in increasing social motivation and sensory seeking as well as social functioning in children with ASD (Bass, Duchowny, & Llabre, 2009; Borgi et al., 2016), the high cost of implementing these programs has been cited as a limitation in the treatment (Anestis, Anestis, Zawilinski, Hopkins, & Lilienfeld , 2014). Expenses related to stabling, veterinary care, routine maintenance, and facility upkeep all contribute to program costs. Interventions including guinea pigs in school classrooms, like those introduced by O'Haire and colleagues (2013), appear to offer one of the lowest cost and easy to implement options. Guinea pigs are routinely able to be maintained as classroom pets; they may be safely cared for and handled by children with adult

supervision. In addition, it is possible to incorporate social-skills focused AAIs within the naturalistic context of the classroom, which could potentially have implications for generalization of skills as well as feasibility. Like working with guinea pigs, including dogs also allows for implementation of social skills training in the child's natural environment (e.g., school). While the model used in the current study did not include costs related to finding, training, or maintaining therapy dogs (which was provided by independent volunteers), it did require more administrative tasks than an intervention with guinea pigs. These tasks overlap with those needed for many equine programs, including finding and training volunteers and coordinating volunteer schedules (Gabriels et al., 2012).

Aside from logistical differences, the type of animal included in the social skills training plays a major role in the nature of the social interactions offered. Although research on the differences between sensory inputs offered by riding a horse versus touching an animal is not yet available, it seems likely that the act of riding a horse offers a great deal more sensory input than that offered by petting dogs or guinea pigs. Accordingly, horseback riding has been found to engage the sensory motor system in a way that closely resembles a walking gait (Uchiyama, Ohtani, & Ohta, 2011), and studies of equine-assisted therapy on social functioning have found that children with ASD show improvement in motor ability (Borgi et al., 2016) and decreases in lethargy and hyperactivity (Gabriels, 2012). Like horses and dogs, guinea pigs allow opportunities for prosocial behaviors, like grooming and caretaking; however, due to their small size, acts like grooming and petting require a degree of motor control that may be difficult for children with ASD, who often exhibit weaknesses in motor development (Fournier, Hass, Naik, Lodha, & Cauraugh, 2010). Dogs are highly attuned and responsive to human social behaviors compared with other animals (Topál, Kis, & Oláh, 2014). Their responsiveness to human gestures was used in the current study to reinforce prosocial behaviors in children in a way that would be challenging to replicate in frequency and consistency in interventions with other animals. For instance, in learning to make eye contact prior to a verbalization, children were able to ask for and receive eye contact from the dog using the "watch me" command. The children's eye contact behavior was reinforced when they were then able to ask for and engage in a preferred interaction, such as asking for the dog's paw. As was observed in the current study, dogs may also be helpful in engaging reluctant participants. Their willingness to sit quietly with children who needed time to warm up to an activity or request attention from children on the outskirts of the group seemed to provide a nonverbal support that might not be as easy to solicit in models with other animals.

Overall, this study provides preliminary evidence that social skills training with dogs is an effective approach for youth with ASD, and it seems to support the movement toward including socially motivating experiences into ASD treatments. The largely positive results suggest the need for more research with larger sample sizes and the inclusion of participants from various treatment settings (e.g., community schools, outpatient clinics, etc.). Future research must also aim to discover whether motivation to engage in human–animal interactions does contribute to improved treatment results, as we and others have suggested. The problem of investigating motivating factors or emotional states is particularly challenging when working with youth with ASD, since deficits in expressive language and emotional awareness are consistent with the diagnosis. One solution may be to expand research into the effects of human–animal interactions on physiological changes related to stress (e.g., cortisol, blood pressure), pleasure, and social connectedness (e.g., oxytocin), which will shed light onto physiological changes that act to reinforce engagement with animals.

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Conflicts of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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"All Those Ingredients of the Walk": The Therapeutic Spaces of Dog-walking for People with Long-term Health Conditions

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ABSTRACT We currently know little about how dog-walking contributes to health and wellbeing of adults living with long-term health conditions. Guided by a conceptual framework of "therapeutic mobilities," we accompanied 13 adults with diverse long-term health conditions on their usual dog-walk. We captured conversations about health and wellbeing through audio-recordings. Interactions with environment, other humans, and between humans and dogs were captured via video-recordings. We provided each participant with a transcript and video-recording of the dog-walk-along interview and met all participants again for a further seated interview. Guided by participants, we developed a series of themes: a special relationship, motivation (an obligation of love), social isolation and connections, and the dog-walk recipe. From these themes, we developed a model of inter-linked and fluid "therapeutic spaces" through which dog-walking can enhance or diminish wellbeing in people with long-term health conditions. Humans with long-term health conditions develop close relationships with their dogs. This "obligation of love" takes humans in to the Dog-walk space where gentle encounters and pleasant sensations enhance human wellbeing. Further research will identify ways in which people with long-term health conditions might further access dog-walking therapeutic spaces, thereby enhancing therapeutic encounters with other humans, dogs, and the environment.

Keywords: dog-walk-along interview, health condition, mobilities, wellbeing

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Dog-walking contributes both positively and negatively to health and wellbeing in healthy adults (Campbell, Smith, Tumilty, Cameron, & Treharne, 2016; Christian et al., 2013; Wharf-Higgins, Temple, Murray, Kumm, & Rhodes, 2013). Healthy adults who walk their dogs are more likely to achieve physical activity levels that are linked to better health outcomes (Christian et al., 2013). Other benefits include better psychological health (such as less stress) (Wharf-Higgins et al., 2013) and greater social connectivity (Wood et al., 2015). Conversely this activity can be detrimental to human wellbeing in that people worry more about dogs with anti-social behaviors and consequently avoid human and dog encounters (Campbell et al., 2016; Degeling, Rock, & Riley, 2016). Dog-walking can be considered a component of dog ownership and, whilst it is important to note the health and wellbeing benefits associated with this relationship as a whole (McConnell, Brown, Shoda, Stayton, & Martin, 2011), in this study we focus on the common activity of dog-walking.

Dog-walking might also contribute to perceived health and wellbeing in people with specific long-term health conditions. People with chronic health conditions can experience greater social isolation than the general population (Rokach, Lechcier-Kimel, & Safarov, 2006). Consequently, they might be more likely to seek the comfort and company of a companion animal (Gilbey & Tani, 2015). This raises questions about dog-walking: How do people with mobility problems, cognitive challenges, pain, and shortness of breath walk their dog? In a study which explored experiences of people with HIV, dog owners felt that dog-walking helped to provide structure and routine (McDonald, Slavin, Pitts, Elliott, & Healthmap Project Team, 2015). In a postal survey, Wells (2009) found no statistical association between pet attachment and self-reported health status in people with chronic fatigue syndrome (n = 193); however, participants reported beliefs that pets contributed to quality of life. Researchers found that dog-walking was often the only sustained physical activity for many participants with type II diabetes (Peel, Douglas, Parry, & Lawton, 2010). Johanssen, Alstrom, and Jonsson (2014) found that pet ownership (dogs and cats) contributed to a meaningful life in older stroke survivors, and motivated participants to recover physically and psychologically. In a study that explored how men with multiple sclerosis continued to exercise with fatigue, researchers noted that daily dog-walks were a way to maintain regular physical activity (Smith, Fitzgerald, & Whitehead, 2015). From these studies, it appears that dog-walking has potential health and wellbeing benefits for people living with long-term health conditions; however, research is needed to move beyond these condition-specific previous findings to develop a wider picture in these populations. Ultimately, this knowledge will identify ways in which dog-walking can be promoted, enhanced, and supported for people with long-term health conditions.

In previous studies, we identified both positive and negative health and wellbeing experiences in self-reported "healthy" adults (Cameron, Smith, Tumilty, & Treharne, 2014; Campbell et al., 2016). Through dog-walk-along interviews and individual participatory analysis sessions, we captured visual, verbal, interactive, and reflective data that enhanced descriptions of how dog-walking influenced human health and wellbeing (Cameron et al., 2014). This approach was not without drawbacks that included: safety issues (walking in the dark, walking and talking near steep drops, busy roads and icy sidewalks), and researcher influence on usual human and dog-walking behaviors.

Dog-walking research has yet to fully address how those positives and negatives are experienced by people with long-term health conditions. In this study, we aimed to develop a deeper understanding of connections between dog-walking, health, and wellbeing for this population using an ecologically meaningful mobilities paradigm (Garcia, Eisenberg, Frerich, Lechner, & Lust, 2012; Van Cauwenberg et al., 2012).

Methods

Design

Our research design was situated within the mobilities paradigm (Buscher, Urry, & Witcheger, 2011). The phenomena of interest (human health and wellbeing) were investigated through interactive actions, movements, and perceptions of a human and dog on a usual walk. Gatrell (2013) conceptualized the wellbeing benefits of movement in a framework of "therapeutic mobilities." In our previous work (Campbell et al., 2016), we identified parallels between this framework and our own results, namely connections, physical activity, and engagement with pleasant landscapes. Participants were encouraged to contribute to the analysis in a participatory analysis session. This study was approved by the University of Otago Human Research Committee (Health) reference number: D13/390.

Recruitment and Data Collection

Participants were recruited through advertisement and editorial features in a local newspaper and through snowball sampling. Most of our participants responded to our advertising flyer. Three participants were recruited after they were informed of the study by: 1) their friend, 2) a colleague of the PI, and 3) an advocacy organization. We purposively sampled to maximize sample diversity with regards to age, gender, ethnicity, and type of long-term health condition. Participants were eligible if they were aged 18 or over, walked their dog a minimum of three times per week, and reported a long-term health condition, as defined by the New Zealand Ministry of Health (2016). Individuals who contacted the principal investigator (PI), were supplied with an information sheet and asked to confirm their interest in taking part within two weeks.

The PI met participants at the usual starting point and time of their dog-walk (from the participant's home or from a carpark at the start of the walk), where participants were given an opportunity to ask questions and were asked to read and sign a consent form. Each participant was given a NZ$20 pet-care voucher.

We used a published checklist (Cameron et al., 2014) to minimize physical harm during dog-walk-along interviews. No injuries were sustained by participant, researcher, or dog during these interviews. Participants were asked to proceed with their usual dog-walk routine. During the course of the walk, the PI asked two specific open-ended questions. The first question was considered an icebreaker to encourage the participants to share information about their relationship with the dog: "Can you tell me a little bit about your relationship with [dog]?," "How long have you had [dog]?" The second question was: "How do you think walking [dog] influences your feelings of health and wellbeing?" No other questions were scheduled and the researcher followed up from there with prompts such as: "Can you tell me a little bit more about how dog-walking helps you to relax?" As part of the inductive process, we also added questions based on participant data from early interviews, for example, "some dog-walkers have talked about not wanting to engage with other dog-walkers and some really enjoy meeting other dog-walkers … how does that fit with you?" The PI was careful not to engage the participant at times when their dog demanded focus and often switched between observation, conversation, and questioning.

The dog-walk-along interview was video- and audio-recorded. Both PI and participant wore a small, light-weight, head-mounted camera with a quick start mode. In addition, the participant wore a digital voice-recorder with a lapel microphone attached to outer layers of clothing. Shortly after each interview, the PI recorded field notes via digital voice-recorder.

Data Analysis

Audio-recorded data were transcribed verbatim, and contextual data (observable from video-recordings) and PI field notes were added (including dog behaviors, participant facial expressions, tone of voice, gestures, and environmental descriptions). This work was completed primarily by a research assistant, with input from the PI. Video and transcript were sent to participants who were later contacted by the PI to arrange a participatory analysis session (PAS). At participatory analysis sessions, participants were encouraged to talk about the data and reinforce how they thought dog-walking influenced their health and wellbeing. The PI talked about shared and/or unique experiences of other participants. The participatory analysis sessions were audio-recorded and transcribed verbatim.

Guided by the "therapeutic mobilities" framework proposed by Gatrell (2013), we used a thematic analysis process (Braun & Clarke, 2006). The process consisted of multiple readings, identification of codes, and arrangement of related codes into categories and eventually links between categories that helped us to identify themes (Braun & Clarke, 2006). Once preliminary themes were identified, a summary was sent to participants for optional comment. Some participants returned feedback, and one set of comments challenged us to refine our analysis resulting in the proposal of a theoretical model. The dataset therefore consisted of four sources: transcripts of the dog-walk-along interviews, transcripts of the PASs, the PI's field notes, and the participant comments on the preliminary analysis. We did not use qualitative software to organize our data.

Results

We conducted 15 dog-walk-along interviews and 12 PASs with 13 participants (seven women and six men)—a total of 27 interviews over a 12-month period. One participant was unable to continue with the study after the dog-walk-along interview due to declining health; for one participant, data were collected at two dog-walk-along interviews due to the walks being short and the participant expressing a specific geographical goal of walking a little further; another participant combined cycling and dog-walking and we thought it would be safer not to be accompanied by a researcher. This participant wore a head-mounted camera for two dog-walks as the camera malfunctioned on the first. Participants were aged between 31 and 80 years of age: 30–39 years old (n = 1); 40–49 (n = 2); 50–59 (n = 7); 60–69 (n = 2); 70–79 (n = 1). They presented with a range of long-term health conditions; six participants had more than one long-term health condition. Health conditions presented were: Parkinson's disease, multiple sclerosis, chronic low back pain, diabetes, asthma, sarcoidosis, stroke, traumatic brain injury, cauda equine lesion, cerebral autosomal dominant arteriopathy, osteoarthritis, anxiety and depression. Dog-walk-along interviews took place at sports fields, beaches (on sand, on road, and on track), and around suburban city streets. Dog-walks included a mixture of both on- and off-leash walking and lasted between 12 minutes and 75 minutes (mean length of dog-walk: 46 minutes).

Analysis

We identified four interlinked themes about dog-walking and feelings of health and wellbeing. All participants described an overall "special relationship" with their dog. This special relationship reflected the wider context of dog guardianship but was significant in that it acted as a "motivator" (our second theme) for regular dog-walks. "Social isolation and connections" describes how participants (particularly those who experienced pain, fatigue, cognitive decline, or psychological distress) experienced a sense of disconnect from friends, family, and society.

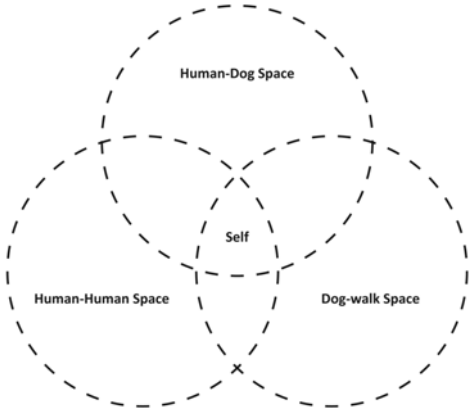

Figure 1. Dog-walking therapeutic spaces. In this model, the dotted borders indicate varying degrees of permeability between dog-walking spaces. Where borders are more permeable, these spaces can be considered therapeutic, as human wellbeing has the potential to flourish; however, where borders are less permeable, wellbeing might decline.

Dog-walking helped to lessen this sense of isolation by exposing participants to regular, non-demanding encounters that centered on the joy of dog ownership. Participants described how special relationships and gentle social connections were ingredients in theme four: an embodied experience called the "dog-walking recipe."

In the second step of our analysis, we developed a theoretical model based on the four themes called "dog-walking therapeutic spaces" (Figure 1). This model represents three interlinked relational spaces between humans and dogs. These spaces are described through internalized embodied experiences and are shaped in turn by the built or natural environment. In these spaces, perceived health and wellbeing can flourish or decline. In the sections below, we will describe the four themes and then explain how they contribute toward the dog-walking therapeutic spaces model.

Special Relationship: Most participants had previously owned a dog either as an adult or had a dog in the household when growing up. Participant 13, who had not liked dogs while growing up, went on to legally adopt a friend's dog after the friend was unable to provide further care. Three participants in the study cared for a second dog that they did not legally own (and did not live with fulltime). One participant shared care for a dog recovering from surgery and considered themselves an "aunty" (Participant 3).

Participants described their dog's intuitive actions and empathetic gaze, and this was observed during dog-walks where dogs might turn and look at the participant when there was a choice of routes to take or a road to cross. The dog's gaze could also communicate recognition of significant events. For example, on one dog-walk, the PI observed a moment when the dog sat down on the sidewalk for no apparent reason and participant and dog momentarily shared a look. The participant mentioned briefly about having fallen on the ice a few years previously but the dynamic nature of the walk immediately distracted the PI from asking further questions. At the PAS, the participant explained how ever since falling at that spot, his dog sits there for a few seconds every time, and described these events as: "moments that just catch you … I look at her eyes and almost don't breathe" (Participant 2). Participants felt that the

empathy, intuition, and understanding of their dog was something they did not experience with most humans. Participant 5 commented on the preliminary findings and cautioned that it was possible to become too dependent on this special relationship and that as a consequence humans might choose to actively withdraw from human company.

Continuous communication between participant and dog either through look, voice, leash, or other non-verbal command was evident in all data sources. On one dog-walk, a participant's dog stopped on the footpath, looked across the road and then back at the participant who explained: "We go down there sometimes that's why he's looking over there. He's real subtle [To Jake who is looking across the road: aren't you. Good boy]" (Participant 10). Two participants and their dogs both had surgery at the same time and described how dog-walking (as part of the rehabilitation process) had strengthened their bond: "you know, we've both been through challenging surgeries and long recoveries and we've both got bits of metal and stuff in us, so we are sort of like a pair now" (Participant 10).

With respect to dog-walking, participants described how development of the special relationship took time and preparation. Participant 12, who acquired his dog 18 months before the study, did not feel a strong attachment to his dog. He felt that his decision to adopt was rushed and had not realized the dog had fear-aggression behaviors. On a dog-walk, his dog attacked other dogs and prevented him from engaging in social interactions with other dog-walkers. Two months later at the PAS, he described how constant observation during dog-walks, and veterinary/dog behaviorist advice, had helped him to feel more confident when encountering other dogs. He referred to the dog-walk-along interview transcript and said: "I'd probably change that a little … I'd probably be very surprised how, if I did lose her, how much I was emotionally attached to her" (Participant 12). Another participant with mobility and balance restrictions explained how he and his dog had learned to walk safely together:

She had to get out of the way [of me], I just walked, I didn't get out of her way, she learned that she had to get out of my way … any learning we've done, we've done together. I haven't taught her things to do, she's taught me a few tricks. (Participant 11)

All participants recognized that the special relationship with their dog provided motivation to walk.

Motivation (an obligation of love): Several participants knew that a dog would motivate them to walk and acquired one on this basis. For others who had a dog when they became unwell, motivation to recover and return to dog-walking was driven by "an obligation of love" (Participant 5).

I think that in some ways Sandy has helped me to maintain basically a bloody- minded determination, well she's got an absolutely bloody minded determination to get out to walk and she barks and chases me around the house as in, come on get on with it, and so there's a kind of a mutual push. (Participant 5)

Routines (including dog-walking routines) were important to participants. One participant wrote on his transcript:

I enjoy the regular … well … being regular with Tasi has brought into my life, the return of the walks, feeding her. On thinking about it, my oncologist says that after a brain event some sort of regular activity or routine is important 'cos the brain is confused … out of sorts, so regularity has … is making me more confident as a person. (Participant 12)

Several participants felt that their dog/s could motivate them to walk faster by pulling gently on the leash, by running away, or simply by walking ahead of the participant. Participant 10 noticed

that her dog adjusted his speed depending on how much pain she was feeling. The dog-walk was an obligation of love that led to social connections with other dogs and humans.

Social Isolation and Connections: All but one participant expressed feelings of loneliness and social isolation as a result of their health condition: "Some days I see nobody or talk to nobody" (Participant 1). Some felt they had nothing interesting to say to other humans. For others, pain levels could cause low moods and periods of anger. One participant was confined temporarily to her home after back surgery and was motivated by her dog to get out and walk in the community as soon as possible:

I could only walk a couple of blocks at a time to start off with … I think there was a dairy [corner shop] about two blocks away that was my walk every day with him … he needed the walk … I didn't want to but he kind of forced me to get out of the house. (Participant 10)

Two participants described how walking their dogs deflected attention from their perceived impairments. One participant who felt that she "wobbled" when walking, described her large dog as a distractor "When I'm walking with them, nobody'd be looking at me and thinks I'm drunk at 8.30 am because they are all looking at Baby Blue, asking if he is a horse" (Participant 1). Another participant felt limited in things she could say about herself to others and instead chose to talk about her dog: "So if I don't want to talk about myself I talk about Mac, yeah. He's a good place, a good thing to hide behind sometimes. [Researcher: Right…] Mm, especially if I'm feeling a bit useless" (Participant 7).

Participants described how conversations and encounters with family, friends, and healthcare providers could be, at times, difficult and demanding. Participant 3 described how chronic pain would make her so angry and irritable that she would isolate herself as a protective mechanism for family members. Many of the participants described conversations with other humans on a dog-walk as pleasant and undemanding "Mums and Bubs [babies] chats" (Participant 3), about how they acquired their dog, which veterinarian they use, and what their dog eats. Several participants described their dogs as ice-breakers in that dog-related conversations were brokered by one dog wanting to sniff another. Interactions observed on the dog-walks were brief:

Passerby: "How old is the dog?"

Participant 7: "He turns ten this week. The wee boy across the road wanted to know is he going to have a birthday party [laughs]."

Passerby: "I will let you go first."

Participant: "Thank you."

Passerby: "You have a good day."

Participant: "You too."

However, participants described longer conversations with others and, it is possible that wearing a head-mounted camera whilst talking to the PI during a dog-walk-along interview, modified participants' usual encounters. Occasionally, participants experienced stressful encounters whilst dog-walking. During one dog-walk-along interview, I observed two dogs persistently ignoring participant 9's commands which she described as "frustrating," and the only verbal exchange with another human during this interview was when another dog owner asked the participant to put her dogs back on their leashes due to their anti-social behavior. Participant 4 described an incident where a non-dog-walking human had forcefully kicked one of her dogs. These (on-the-whole) gentle encounters were an "ingredient" of a dog-walk that enhanced wellbeing and others are described in the last theme.

The Dog-walking Recipe for Health and Wellbeing: On a dog-walk, multi-sensory factors (sensations, sights, sounds, and smells) contributed to descriptions of positive affect, triggering of pleasant memories, and distraction from negative thought processes. Whilst participants had different preferences, all described that a combination of factors was important. One participant described the dog-walk as being like the skill of baking a cake:

In other words, if you are going to bake a cake … you are going to bake it for the right amount of time, you are going to put the right ingredients in. If you miss one thing out, you are not going to get an end result. So, if you go and sit in your car, you can see it [the ocean]. If you wind down your window, you can hear it. Can you fully experience it? No, if you don't get out of the car … you're half baked, you are not getting the full benefit that you would get out of it if you got out of the car and walked. Because all of a sudden, all those ingredients of the walk are there, so that when you get back you've baked the cake totally and you have had all the right ingredients in it, so the result is going to be spot on. (Participant 3)

On a dog-walk, participants described the joy and pleasure they felt simply "letting him [the dog] be what he wants to be" (Participant 13). One participant explained as his dog raced down the beach: "To watch her sprinting along the shore, racing an Oyster Catcher [seabird], it's just a beautiful thing. [She] looks lovely when she runs and so happy" (Participant 5). Watching the sea was described as "calming" (Participant 3) and "uplifting" (Participant 4).

Participants described uplifting sights, smells, sounds, and feelings of nature. One participant described the dog-walk as a "great de-stressor" (Participant 6) and went on: "I love just seeing the magnolias" … "It's one time of year that I can smell this honeysuckle … it's incredibly fragrant." This participant explained she had previously lived in another geographical location that was not a pleasant natural landscape that, despite the "obligation of love," made dog-walking less desirable. Another participant described the pleasurable feeling of "fresh air" on the face and in their lungs: "It's clear … like you get clear water and dirty water … the clear water is the fresh air and the dirty water is the stale old air you get left in a house or buildings … I don't feel so choked up" (Participant 9). For this participant, the feeling of fresh air triggered happy memories of being a young cross country athlete. Multiple experiences on a dog-walk could help to distract the mind from negative thoughts: "it just calms your thought passages … there's so many things that you can see … like I said the houses, vehicles, people, kids" (Participant 2).

Two participants liked their bodies feeling warm on the inside during a walk as one participant with mobility restrictions explained: "Sometimes, you don't get warm all day if you haven't done some sort of exercise" (Participant 2). Several participants recognized dog-walking as an important contributor to physical activity levels and enjoyed feeling respiratory and heart rates raised, although some participants only realized that they had been "puffing" (Participant's 6,7, and 11) when they watched video footage of the walk. For some, this realization reassured them that they were getting adequate exercise: "It's interesting when you hear the video and the breathing [laughs] going up those hills. I mean maybe there is a bit more cardio happening there than I thought [laughs] (Participant 6). Others interpreted "puffing" as a sign that they were less fit than they had thought: "I noticed was how often I was puffing so I thought right, time to increase that [walking duration]" (Participant 7). Some participants felt that dog-walking reduced their symptoms of pain, and participant 11 (with Parkinson's disease) felt he was able to stand straighter whilst passing his dog's leash back and forth behind his back.

Not all sensations experienced were pleasant. Some participants experienced unpleasant and painful sensations during or following their dog-walk. Participant 7 had to change grip several times on both leash and walking frame as her shoulder pain increased. Participant 8, who

walked with one elbow crutch, felt his knee becoming "as cold as ice" during the dog-walk. Some participants experienced negative feelings on the dog-walk. For example, participant one was worried about not being able to provide enough exercise for the dog due to mobility restrictions, pain, and fatigue and, had already started to organize an informal network of dog-walkers. Because of pain and mobility restrictions, Participants 7 and 8 walked a short distance with their dogs each day and then took them for a longer run beside their mobility scooters.

Therapeutic Spaces: As the four themes developed, we began to see that dog-walking can be modelled as a series of interconnected and relational spaces: At the center is the Self, which can be considered the embodied space of the dog-walker where sensations and affect are experienced. Self integrates with the Human–Dog space, the Dog-walk space, and the Human–Human space. The Human–Dog space represents the familial relationship between human and dog. The Dog-walk space represents interactions between humans, dogs, and the physical nature of the environment, and overlaps with the Human–Dog space through motivation to dog-walk. The Human–Human space overlaps with the former two spaces and includes relationships and encounters with other humans both in the dog-walk and outside of the dog-walk space. In these spaces, there is potential for the wellbeing to flourish or decline. The borders of these spaces can be conceptualized as having varying degrees of permeability. Movement between spaces, across more permeable borders, creates potential for human wellbeing to flourish and can therefore be considered therapeutic (e.g., the border between Self and Human–Human space could become more permeable via the Human–Dog and Dog-walk space when an individual takes a dog for a walk and has positive encounters with other humans). In contrast, frictions experienced at less permeable borders can negatively influence wellbeing (e.g., the borders between Self, the Human–Dog space, and the Human–Human space might become less permeable if the human is more dependent on the comforting relationship with their dog and chooses to isolate themselves from other humans). In this scenario, the potential for wellbeing to flourish in the Human–Human space is diminished.

Discussion

We used mobile methods (dog-walk-along interviews and participatory analysis sessions) to capture data about how dog-walking influences health and wellbeing. These methods were developed from earlier "mobile" studies (Garcia et al., 2012), with the added novelty of collecting audio and video data via head-mounted cameras.

We found that people with long-term health conditions (the Self) developed a special relationship with their dog; in our model, we have called this relationship the Human–Dog therapeutic space. This relationship developed (in part) because of perceived isolation from relationships in Human–Human spaces (family, friends, and work colleagues). Perceived isolation resulted from symptoms of, and stigma associated with, long-term health conditions. The special relationship motivated participants to provide something essential and pleasurable for their dog— a dog-walk. This desire to "give" echoed results from our previous study with healthy adults, where we discussed that the act of giving is recommended as a way to achieve better wellbeing (Campbell et al., 2016). This "act of giving" drew participants into the Dog-walk space, where they also experienced encounters, sensations, and physical environments (The dog-walk recipe) that influenced the Self.

At times, some participants were too unwell to walk their dogs, which caused worry and guilt. For these participants, the Dog-walk space was shrinking and frictions were experienced

at the intersection of the Human–Dog and Dog-walk space. Strategies such as volunteer dog-walkers helped to alleviate this, yet the concept of "loaner" dog-walking is under-explored. In one study, researchers found that walking a dog that is not "owned" can have perceived beneficial effects for the walkers (Johnson & Meadows, 2010). It would be useful in future studies to explore experiences of people who walk dogs that are not their own and of people with long-term health conditions who need to use the services of a "loaner" dog-walker. Such research would be particularly relevant in translating findings about the potential health benefits of dog-walking into some form of intervention or scheme to encourage dog-walking for people who do not currently live with a dog.

Several participants felt socially isolated when they couldn't communicate their health experiences to others and these conversations were perceived as being challenging. Loneliness and social isolation are described as two distinct yet related states. Social isolation is defined quantitatively as "reduced social network size and paucity of social contact" (Steptoe, Shankar, Demakakos, & Wardle, 2013, p. 5,797), and loneliness as "the psychosocial embodiment of social isolation" (Steptoe et al., 2013, p. 5,797), where individuals perceive negative experiences of reduced social contact. On a dog-walk, participants in our study enjoyed the undemanding (and often brief) nature of conversations with other humans. Using our dog-walking therapeutic spaces model we propose that humans with long-term health conditions might withdraw from engagement with other humans because of stressful interactions, and the process of dog-walking leads to a less-demanding form of human reconnection. Connections with other humans, dogs, and communities reflects results from previous research with healthy adults (Campbell et al., 2016; Wharf-Higgins et al., 2013; Wood et al., 2015).

The special relationship acted as a motivator for both human and dog to enter the Dog-walk space. In this space, perceived human health and wellbeing could flourish or decline. These experiences were shaped by embodiment, the environment, and the intersections between the Dog-walk space and other therapeutic spaces. Embodiment is described as "the experience of *both* being and *having* a body" (Lyons & Chamberlain, 2006, p. 57), and our dog-walking therapeutic spaces model incorporates participants' recognition of their embodiment through sensory experience, reflections on their wellbeing, and interactions with others. Intersections between other non-dog owners (Human–Human spaces) and dog-owners (Human–Dog spaces) could be helpful or harmful. For example, gentle conversations that centered on the joy of owning a dog were helpful; however, a human kicking a participant's dog for approaching them was harmful. Dog-walking is recognized as a significant contributor to better community engagement (Toohey, McCormack, Doyle-Baker, Adams, & Rock, 2013; Wharf-Higgins et al., 2013; Wood et al., 2015); however, the results from our study suggest that for people with long-term health conditions, the undemanding nature of most dog-walking encounters contrasts positively with other more stressful human interactions.

Participants experienced both pleasant and unpleasant bodily sensations in the Dog-walk space. Pleasant sensations, positive encounters, feelings of doing something worthwhile, and "spending time with a [canine] friend" led to positive wellbeing. Some participants experienced a sense of reward even though dog-walking was hard and caused pain, fatigue, and other unpleasant sensations. The embodied experience of walking has been discussed in previous literature. Edensor (2000) describes both pleasant and unpleasant bodily sensations when walking through the English countryside. Zeaman (2011, p. 2) describes his dog-walk as "he

pulls me out of myself, out of my complicated human life of news, bills, work, responsibilities, and ceaseless chatter—and into a much simpler existence". Both Edensor and Zeaman describe their individual embodied experiences. To our knowledge, the current study is the first to describe the multi-sensory experiences of dog-walking across a participant sample. Despite a current research focus on the physical health benefits of dog-walking for healthy adults (Christian et al., 2013), the participant's in our study did not appear to prioritize the physical health benefits of dog-walking. Being active is one of the New Economic Foundation's five "ways to wellbeing" (Aked, Marks, Cordon, & Thompson, 2008), others are to: Connect, Take notice, Keep learning, and Give. Previously, we identified that "giving" and "connection" were two ways that healthy adults experienced better wellbeing through dog-walking. In the current study, we learned from people with long-term health conditions that "taking notice" (via the multi-sensory "dog-walk recipe") and to a lesser extent "learning" (e.g., Participant 11 and his dog learning to walk together as part of the "special relationship") completed the five recommendations. This further highlights how dog-walking has the potential to influence all dimensions of human wellbeing.

The dog-walking therapeutic spaces model could be used as a way of further identifying positive and negative influences of dog-walking on human wellbeing. One border to explore might be the physical boundaries between where dogs are allowed to walk and where they are not, expanding a participant sample to include policy makers, health professionals, and non-dog walkers or owners. For example, McCormick, Rock, Sandalak, and Uribe (2011) found that different street layouts influenced dog-walking patterns, and off-leash exercise area proximity resulted in less overall weekly dog-walking. It would be useful to explore how dog-walking spaces are designated, governed, and monitored and how these processes shape dog-walking experiences in different geographical areas.

Limitations

Inclusion criteria specified people who walked their dog three times a week or more. This was an arbitrary decision partially based on previous literature reviews (Cutt, Giles-Corti, Knuiman, & Burke, 2007) and partially based on our clinical conversations with patients who walked their dogs. We realized through ongoing contact with participants that deteriorating health results in less dog-walking. Capturing these changes longitudinally would add further insights about how dog-walking influences the health of people with long-term health conditions.

This study was conducted in a New Zealand city renowned for close and accessible areas of outstanding beauty, and one of our participants told us that this influenced the enjoyment, length, and frequency of their dog-walks. Beautiful landscapes can influence the wellbeing of humans; however, Zhang, Howell, and Iyer (2014) argues that this may only apply to humans who are already attuned to the beauty of nature. It would be useful to repeat our study methodology in different geographical locations as it is quite possible that embodied experiences shaped by the landscape might not always be therapeutic in other settings.

Mobile methods capturing video data have been applied in a mobile phenomenological ethnographic research method developed by Wilhoit and Kisselburgh (2016), who identified similar disadvantages and advantages to those we identified in previous studies (Cameron et al., 2014). In our study, the PI did not always view video footage with the participant and recommend this as a potentially useful "retro-active sense-making" (Wilhoit & Kisselburgh, 2016, p. 123) strategy for future studies. Online journal platforms provide an exciting opportunity to use video clips in addition to participant quotes to enhance qualitative analyses. In the current

study, ethical considerations around participant anonymity led to author decisions not to use videography to enhance dissemination.

During our dog-walk interviews, participants engaged in brief yet frequent encounters with humans who were not participants—we called this "collateral capture." We had not factored a need to seek consent from these people into our study design or ethics application process. There are arguments both for and against actively seeking consent for people whose words and/ or images are captured in this way (Wiles, Clarke, & Prosser, 2012). The dog-walk-along interview offers an opportunity to collect data about the phenomena under investigation in a "naturalistic" way, yet we intuited that whilst participants were accompanied by the researcher, interactions were more fleeting than the regular encounters described by participants. These brief encounters also felt awkward; neither the researcher nor participant discussed the study with other humans along the walk. In future studies that use dog-walk-along interviews, we will explore more ethically robust ways of addressing "collateral capture." For example, Palmer (2016) video-recorded verbal consent on-the-spot from participants in a charity sporting event. Palmer videoed a dummy clip of how this consent process might look and submitted with her application to the Ethics Committee—the application was approved (Palmer, 2016).

Conclusion

This study has provided a novel demonstration of some of the ways dog-walking can influence human wellbeing, both positively and negatively, for dog owners/guardians who have a long-term health condition. These influences occur through emotional affect, multi-sensory experiences, and social encounters with other humans and dogs. The act of giving something pleasurable to another being appears to override some of the negative aspects (such as an increase in pain symptoms) of dog-walking. Further research is required to determine whether people who "borrow" dogs experience similar wellbeing benefits with dogs that they walk. Future studies could sample policy-makers and urban planners to discover more about how individual, built, societal and cultural borders between therapeutic dog-walking spaces could become more permeable.

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Conflict of Interests

No potential conflict of interest is reported by the authors.

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ANTHROZOÖS VOLUME 30, ISSUE 2 PP. 341–345 REPRINTS AVAILABLE DIRECTLY FROM THE PUBLISHERS PHOTOCOPYING PERMITTED BY LICENSING ONLY

NEWS AND ANALYSIS

New Books

Animal Welfare in Australia: Politics and Policy

By Peter John Chen

The issue of animal welfare has become an increasingly significant part of the policy and political landscape in Australia in recent decades. Yet despite this increased interest, the policy process as it relates to human–animal relations in Australia is poorly understood. *Animal Welfare in Australia* is the first Australian book to examine the topic in a systematic manner. Without taking a specific ethical position on the treatment of nonhuman animals, Chen draws on a wide range of sources—including activists, industry representatives, and policy elites—to explain how policy is made and implemented. He explores the history of animal welfare in Australia, as well as contemporary public opinion and media coverage of animal-welfare issues. In the process, he maps the policy domain, demonstrating the complexity of policy-making networks and the difficulty of pinning down public opinion on animal-welfare issues. Published by Sydney University Press in 2016. ISBN: 9781743324738 (paperback).

Ice Bear: The Cultural History of an Arctic Icon

By Michael Engelhard

The polar bear endures as a source of wonder, terror, and fascination. Humans have seen it as spirit guide and fanged enemy, as trade good and moral metaphor, as food source, and symbol of ecological crisis. Eight thousand years of artifacts attest to its charisma, and to the fraught relationships between our two species. With more than 160 illustrations, *Ice Bear* traces and illuminates this intertwined history. Published in 2016 by University of Washington Press. ISBN: 9780295999227 (paperback).

Stray: Human–Animal Ethics in the Anthropocene

By Barbara Creed

This timely polemic explores the relationship between human and animal in the context of the stray. Working through examples from the visual arts, film, and literature, with reference to prominent writers and philosophers, Creed introduces the concept of the anthropogenic stray and in so doing lays bare the contradictions at the heart of our current condition. The "stray ethics" argued for here, relating both to nonhuman animals and human beings such as

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refugees and the homeless, asks us to abandon our belief in human exceptionalism and see the world and its multispecies as interconnected. Published in 2017 by Power Publications. ISBN: 978-0-909952-90-7 (paperback).

Culture and Activism: Animal Rights in France and the United States

By Elizabeth Cherry

This book offers a comparison of the animal rights movements in the US and France, drawing on ethnographic and interview material gathered amongst activists in both countries. Investigating the ways in which culture affects the outcomes of the two movements, the author examines its role as a constraining and enabling structure in both contexts, showing how cultural beliefs, values, and practices at the international, national, and organizational levels shape the strategic and tactical choices available to activists, and shedding light on the reasons for which activists make the choices that they do. This book will appeal to scholars of sociology, anthropology, political science, and cultural geography with interests in social movements and social problems. Published by Routledge in 2016. ISBN: 9781472476746 (hardback); 9781315575391 (ebook).

Wolf Conflicts: A Sociological Study

By Ketil Skogen, Olve Krange, and Helene Figari

Wolf populations have recently made a comeback in Northern Europe and North America. These large carnivores can cause predictable conflicts by preying on livestock and competing with hunters for game. But their arrivals often become deeply embedded in more general societal tensions, which arise alongside processes of social change that put considerable pressure on rural communities and on the rural working class in particular. Based on research and case studies conducted in Norway, *Wolf Conflicts* discusses various aspects of this complex picture, including conflicts over land use and conservation, and more general patterns of hegemony and resistance in modern societies. Published in 2017 by Berghahn Books. ISBN: 978-1-78533-420-7 (hardback); 978-1-78533-421-4 (ebook).

Venomous Encounters: Snakes, Vivisection and Scientific Medicine in Colonial Australia

By Peter Hobbins

How do we know which snakes are dangerous? This seemingly simple question caused constant concern for the white settlers who colonized Australia after 1788. Facing a multitude of serpents in the bush, their fields and their homes, colonists wanted to know which were the harmful species and what to do when bitten. But who could provide this expertise? Liberally illustrated with period images, *Venomous Encounters* argues that much of the knowledge about which snakes were deadly was created by observing snakebite in domesticated creatures, from dogs to cattle. Originally accidental, by the middle of the nineteenth century this process became deliberate. Doctors, naturalists and amateur antidote sellers all caused snakes to bite familiar creatures in order to demonstrate the effects of venom—and the often erratic impact of "cures." In exploring this culture of colonial vivisection, *Venomous Encounters* asks fundamental questions about human–animal relationships

and the nature of modern medicine. Published by Manchester University Press in 2017. ISBN: 978-1-5261-0144-0 (hardback).

The Animal Game: Searching for Wildness at the American Zoo

By Daniel E. Bender

Zoos were among the most popular attractions in the United States for much of the twentieth century. Stoking the public's fascination, savvy zookeepers, animal traders, and zoo directors regaled visitors with stories of the fierce behavior of these creatures in their native habitats, as well as daring tales of their capture. Yet as tropical animals became increasingly familiar to the American public, they became ever more rare in the wild. Tracing the history of US zoos and the global trade and trafficking in animals that supplied them, Daniel Bender examines how Americans learned to view faraway places and peoples through the lens of the exotic creatures on display. Over time, as the zoo's mission shifted from offering entertainment to providing a refuge for endangered species, conservation parks replaced pens and cages. *The Animal Game* recounts Americans' ongoing, often conflicted relationship with zoos, decried as anachronistic prisons by animal rights activists even as they remain popular centers of education and preservation. Published in 2016 by Harvard University Press. ISBN: 9780674737341 (hardback).

Conferences

ISAZ 2017
Human–Animal Interconnections

June 22 to 25, 2017

This conference will be held at the **University of California, Davis, USA**. Plenaries will address the roles of service dogs and other animals for children, as well as human–animal interactions with wildlife and cattle. There will also be satellite meetings on June 26 "Effective Options Regarding Spay or Neuter of Dogs" and June 27 "Animals Behaving Badly: Veterinary/Welfare Perspectives Improving Client Compliance." For more details, go to: www.isaz.net.

UFAW 2017 International Symposium
Measuring Animal Welfare and Applying Scientific Advances— Why is It Still so Difficult?

June 27 to 29, 2017

This conference will be held at **Royal Holloway, University of London, UK**. For further details, go to: www.ufaw.org.uk/ufaw-events/ufaw-events.

Animals and Social Change
June 29 to 30, 2017

Hosted by the Centre for Human–Animal Studies, this conference will be held in **Liverpool, UK.** It will be of interest to those working in critical animal studies, advocacy, grassroots activism, animal media, and the vegan business community. For further details, send an e-mail to: cfhas@edgehill.ac.uk.

Australasian Animal Studies Association Conference
Animal Intersections

July 3 to 5, 2017

This conference will be held at the **University of Adelaide, Australia**. Talks will cover the following broad themes: Health, wellness, illness, pathologies; The social lives of animals and humans; The intersections of species, race, gender, ablism, and sexualities; Industrialism, capitalism, geographies, and environments; Veg*n Studies; Religion, tradition, and secularity; Culture, symbology, and representation. More details can be found at: http://animalstudies.org.au/conferences.

Behaviour 2017

July 30 to August 4, 2017

This joint meeting of the 35th International Ethological Conference (IEC) and the 2017 Summer Meeting of the Association for the Study of Animal Behaviour (ASAB) will be held in **Estoril, Portugal.** Further information can be found at: http://behaviour2017.org.

International Society for Applied Ethology Congress

August 7 to 10, 2017

This congress will be held in **Aarhus, Denmark**. The theme is "Understanding animal behaviour" and topics include "Animal stress responses," "Human–animal interactions," and "Animal learning and cognition." For further information, go to: www.isae2017.com. Queries can be sent to: isae2017@anis.au.dk.

Canine Science Conference

October 6 to 8, 2017

This is the first North American International Canine Science Conference and is open to scholars from all over the world studying all aspects of all species of canines. The conference will be held at **Arizona State University, Tempe, Arizona**. For more information, go to: http://clivewynne.wixsite.com/caninescience2017.

Minding Animals 4

January 17 to 24, 2018

This conference will be held at the **Centro de Exposiciones de la UNAM (UNAM Conference Centre) at the Mexican National University in Ciudad de México (UNAM)**. The conference co-organizers are Ana Cristina Ramírez Barreto from Morelia and Beatriz Vanda from the Universitario de Bioética at UNAM.

For further details, go to the Minding Animals web site: www.mindinganimals.com or send a message to: mindinganimals@gmail.com.

ISAZ 2018
Animals in Our Lives: Multidisciplinary Approaches to the Study of Human–Animal Interactions

July 2 to 5, 2018

This conference, the first ISAZ conference to be held in the southern hemisphere, will be held at the **Charles Perkins Centre, University of Sydney, Australia**. The official web site (www.isaz2018.com) will launch in late June, 2017.

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BOOK REVIEWS

Run, Spot, Run: The Ethics of Keeping Pets

Jessica Pierce. Chicago: University of Chicago Press, 2016. 264 pages. ISBN-13: 978-0-226-20989-0

Reviewed by: Harold Herzog, Department of Psychology, Western Carolina University, Cullowhee, NC, USA. E-mail: herzog@email.wcu.edu
DOI: 10.1080/08927936.2017.1311066

In a morally perfect world, would we have pets?
Leslie Irvine, (2004, p. 5)

I once interviewed a Ph.D. student who was deeply attached to a pure white female cockatiel that resided in a cage in his living room. Jim's relationship with the bird became a problem after his mother handed him a copy of *The Animals' Agenda*, a now defunct animal rights magazine. Soon Jim gave up meat. Then he stopped wearing leather shoes and convinced his girlfriend to become a vegan. A couple of months later he began to question the morality of living with a bird confined to a cage. Eventually, guilt got the better of good judgment. One afternoon he took his pet into the backyard, and opened the cage door. He told me seeing the cockatiel fly off was an amazing experience. But then he looked down and mumbled, "I knew she would not survive, that she probably starved. I guess I was doing it for myself more than for her."

Obviously, Jim's decision to release his pet was misguided. But Jim's quandary exemplifies the moral paradox of pet-keeping. Pets in industrial societies are increasingly considered *de facto* persons, members of the family. Indeed, a recent *New York Times* headline proclaimed, "Dogs Are People Too" (Berns, 2013). But if we recognize that our companion animals are autonomous beings with rich psychological lives, confining them in our homes, making them come at our beck and call, and depriving them of the pleasures of sex and motherhood becomes problematic. *Run, Spot, Run: The Ethics of Keeping Pets* by bioethicist Jessica Pierce is a major contribution to the literature on problems associated with the human–companion animal bond. Pierce examines a host of ills inflicted on animals by our desire to live with them. Written for the general public as well as scholars, the tone of the book is sometimes breezy, and at times even funny. But ultimately, *Run, Spot, Run* is deeply disturbing.

The book is composed of 48 chapters, each averaging four pages long. The chapters fall into four sections. The first section is a brief introduction to why humans keep pets and why our best pet-related efforts can have unintended consequences. The second section (Living with Spot) focuses on issues related to our lives with companion animals. Among them are

what to feed pets, whether pets actually benefit human health, zoonotic diseases, and environmental problems caused by pet-keeping. The third section examines negative aspects of our obsession with pets such as the commodification of animals, exotic pets, and wanton animal abuse. The final section asks whether is it ethical to keep pets at all.

The large number of short chapters makes for a book which sometimes sacrifices depth for breath. However, this unusual structure enables Pierce to cover a wide range of issues, including ones most readers will not have considered. These include, for example, Internet "pet-shaming," pet food as junk food, and the burden inflicted on the environment by hundreds of millions of tons of pet feces each year in the United States alone. Some of these concerns are relatively trivial (e.g., does your dog really need a product called "Rear Gear" to hide its anus?). For the most part, however, Pierce raises serious issues, and sometimes she comes to surprising conclusions. For instance, she correctly argues that clichés such as "pets are family members" are simplistic and misleading. She is not convinced that pet-keeping enhances empathy and responsibility in children. And she is against keeping birds, reptiles, insects, and fish as pets. Some readers will be disappointed that Pierce is not enthusiastic about the politically correct dogma that all pet cats should be "in-door" cats. And she even gives a fairly positive nod to the idea of renting or leasing a pet.

As with *The Last Walk*, Pierce's 2012 book on aging and dying pets, *Run, Spot, Run* is a highly readable mix of scholarship, exposé, and the author's personal experiences. For the chapters on euthanasia, Pierce took a course for shelter workers and learned how to kill dogs by injecting them in the heart with a solution called Lethal Plus. (She did not actually kill a dog.) To investigate the darkest side of human–animal relationships, Pierce became a lurker on BeastForum, a zoophile chat room. She devotes special attention to institutions and practices she regards as particularly harmful. These include the commercial pet food industry (Pierce advocates home cooking for pets), the animal shelter establishment, and the routine de-sexing of dogs and cats by castration and ovarectomy. Pierce excoriates the pet products industry which she says, "preys on our love for animals and exploits it" (p. 179). While the book covers a plethora of moral quandaries facing pet-lovers, inevitably, some controversial topics are omitted or given only brief treatments. These include, for example, dominance-based dog training methods, ear and tail docking, the genetic problems of pedigree dogs, and the debate over pit bulls and breed-specific legislation.

But when it comes to the big questions, Pierce delivers. Is death preferable to a life spent in a cage in an animal "shelter?" Do claims about the medical benefits of pet-keeping justify using "a living being as a tool to try to better our own health." How much suffering is caused by keeping a goldfish in barren bowl?

In the last chapter, Pierce asks readers to consider whether pet-keeping is inherently immoral. After reading the book, the inescapable conclusion would seem to be yes. After all, she makes a convincing case that that we deny the animals in our lives the most basic rights afforded to humans. And she even argues that the only creatures that can be kept without moral concern are Chia pets (which are actually plants) and Pet Rocks.

Pierce, however, is a life-long animal lover who is deeply attached to her personal pets. And in the end, she blinks by not following the moral case against pets to its logical conclusion. Rather, she writes, "My own best argument for pet keeping is right behind me in my office." It is her dogs Bella and Maya. The problem is that this line of thinking is no different from the meat-eater who justifies consuming animals by saying, "My best argument against vegetarianism is this delicious hunk of filet mignon on the plate in front of me."

Thus, Pierce herself embodies the contemporary pet-lover's conundrum: the more we cherish nonhuman animals and consider them persons, the stronger the argument for eliminating pet-keeping. As the sociologist Leslie Irvine wrote, "If we recognize the intrinsic value of animals' lives, then it is immoral to keep them for our pleasure, regardless of whether we call them companions or pets" (2003, p. 14).

While sometimes upsetting, *Run, Spot, Run* offers a welcome counter to the glut of feel-good books on the shelves of my local bookstore extolling the mystical powers of the human–animal bond. Pierce's book is well-written and researched, smart and provocative. And if you are a pet lover, it will spin your head around.

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The Question of the Animal and Religion: Theoretical Stakes, Practical Implications

Aaron S. Gross. New York: Columbia University Press, 2015. 304 Pages. ISBN: 9780231167505 (paperback)

Reviewed by: Andrea Dara Cooper, Department of Religious Studies, University of North Carolina at Chapel Hill, USA. E-mail: adcooper@email.unc.edu

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Humans have always imagined themselves through animal others—both as animal subjects and as sites of ideological and symbolic construction. In *The Question of the Animal and Religion: Theoretical Stakes, Practical Implications*, Aaron Gross writes, "As a strategic countermove to the myriad of tendencies to render absent, forget, or disavow animals, I propose *attending* to them" (p. 13). Gross challenges readers to critically re-think religion alongside animal others. Animals are more than merely foils to the study of the human. Drawing from the absent referent in feminist analysis,[1] Gross highlights the animal as an absent presence in religious studies. He notes, following Jacques Derrida, that there is no category of "the animal"—there are only animals. This book represents a major contribution to animal studies, the study of religion, and the humanities more broadly, for Gross convincingly argues that we can no longer assume society, culture, and religion to be exclusively human.

Gross draws on Derrida to philosophically trouble the binary between human and animal. In *The Animal that Therefore I Am*, Derrida refers directly to his feline inspiration: "I must immediately make it clear, the cat I am talking about is a real cat, truly, believe me, *a little cat*. It isn't the *figure* of the cat. It doesn't silently enter the bedroom as an allegory for all the cats on earth, the felines that traverse our myths and religions, literature and fables. There are so many of them."[2] This is a real cat, not merely figural; and yet, the cat is indeed a kind of stand-in for the animal gaze—by virtue of its very insistence on a concrete feline presence, in the bathroom, of all places, it functions to disrupt the feline–human divide, to provoke the very human (or is it animal?) emotion of shame at the philosopher's nakedness.

In Gross's view, discussing theories of the animal without mentioning actual animals is radically insufficient. Animal rights are both a theoretical and an ethical concern. The title of Gross's book indicates an admirable attending to both theory and practice. It is no accident, he argues, that violations in the ethical treatment of animals are often paired with violations to human rights. In focusing on recent events at the AgriProcessors kosher slaughterhouse in Postville, Iowa, Gross challenges the assumed relationship between the Jewish compassion for animals and the production of kosher meat. He demonstrates that animal and human rights abuses in the AgriProcessors plant were intimately connected.

The book's pivotal third chapter, "The Absent Presence: Animals in the History of the Study of Religion," investigates how religion has historically been defined and delimited as a strictly human phenomenon. Gross observes that animals are the forgotten center of the modern study of religion (p. 61). This chapter examines Émile Durkheim's sociology of religion, which demarcates the properly human from the animal in examining the sacred/profane binary. For Durkheim, the traditions that became "world religions" had precisely defined human/animal borders. Gross observes that according to both Durkheim and Mircea Eliade, religion begins where the animal ends. Sacred space, for Eliade, is limited to the human. In Jonathan Z. Smith's work, the human/animal divide generates the horizon of religion, with

implications for how humans treat both animal others and other humans. In the next chapter, Gross goes on to examine anthropological analyses of hunter-gatherer communities as lacking both the culture/nature and human/animal binary. The view that indigenous religions do not separate sufficiently from the animal sphere is, as Gross points out, bound up with troubling postcolonial assumptions.

It is at this point in the genealogy that Derrida intervenes. Derrida's later work on animals demonstrates that human self-conception is dependent on the perception of animal others. To speak of "the animal" elides difference and particularity, and it makes us forget there is no "animal," only animals. According to Derrida, the denial of the animal gaze is foundational to the Western philosophical tradition, from Descartes on. Gross points out that this sweeping observation is radical for Derrida, who otherwise argues against centers and generalizations.

Gross goes on to mine the rich Jewish textual tradition on animals, from Judah ha-Nasi, Rashi, Maimonides, and other commentators, in recognition of animal suffering, animal lives, and animal kinship. Gross's final chapters offer a distinctly Jewish philosophy of animals. Gross pushes readers to consider how the question of the animal can be understood to have shaped both Jewish religious and secular identity; does the critical lens of animal studies itself have a Jewish lineage?

In his work on animal studies and religion, Gross examines the roles animals play in human self-conception. Gross argues that both animal subjects and their place in the human imagination "are critical sites through which we imagine ourselves" as human.[3]

He notes the necessity of making animals fully present. Scholars must attend to the actual animal, and not merely the symbolic animal: "One danger of scholarly work on animals, including the present one, is that it can function to render "actual animals" absent … to make animals present, we first need to gain some purchase on how animal others are imbedded in human self-conception—in the human imagination (the landscape of our mind) and the imagination of the human (how we imagine the meaning of humanity)."[4] The study of the animal/human cannot limit itself to meditation on the human subject and idealized representations of animals, forgetting animal others in the process. Gross challenges readers to keep animals actually present in humanities scholarship and beyond.

Notes

1. See Adams, C. (1990). *The sexual politics of meat: A feminist-vegetarian critical theory.* New York: Bloomsbury.
2. Derrida, J. (2008). *The animal that therefore I am* (D. Wills, Trans). New York: Fordham University Press. (p. 6).
3. Gross, A. (2012). Animal others and animal studies. In A. Gross & A. Vallely (Eds.), *Animals and the human imagination: A companion to animal studies* (pp. 1–24). New York: Columbia University Press. (p. 4). In this essay, Gross explains the value of scholarly attention to animals: "such comparative work might help us better understand why the human/animal binary is so often paired with the male/female binary and usually in ways that are good for neither women nor animals … What does considering such diverse examples together tell us about the potentially oppressive mechanisms of dividing the world into human/animal and male/female in the process of imagining humanity?" (pp. 5–6).
4. Gross, A. (2012). Animal others and animal studies. In A. Gross & A. Vallely (Eds.), *Animals and the human imagination: A companion to animal studies* (pp. 1–24). New York: Columbia University Press. (pp. 15–16).

NOTES FOR CONTRIBUTORS

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Anthrozoös will accept new contributions that describe the characteristics and consequences of interaction/relationships between people and nonhuman animals. Papers are welcome from the arts and humanities, behavioral and biological sciences, social sciences, and the health sciences. Note: we are not an animal behavior or animal welfare journal, and we do not publish papers on the epidemiology of diseases, nor do we publish on zoonoses or on the housing of animals or nonhuman influences on animal behavior. We also no longer publish case studies or translations of existing psychometric scales. For intervention studies (e.g., AAT, education programs), we require that a control and/or comparison group was incorporated.

Types of Articles

Review Articles and Research Reports

Reviews—These should address fundamental issues related to interactions between people and other animals, and provide new insights into the subject(s) they cover. Original interdisciplinary syntheses are especially welcome. Reviews should be no longer than 7,000 words in length. Before submitting, authors must check with the editor that the review is needed/timely.

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If studies have the potential to compromise animal welfare, precautions should be taken to reduce possible harm to the animals involved. Authors should identify welfare concerns and describe the measures that were taken to mitigate animal pain or distress. *Anthrozoös* will not accept any manuscripts based on research inflicting suffering or cruelty on animals.

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Informed consent should be given by persons participating in the studies reported. Any sensitive data should be handled with confidentiality and stored securely. When reporting results, participants should remain anonymous.

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