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## Farmyard Animal or Best Friend? Exploring Predictors of Dog vs. Pig Pet Speciesism

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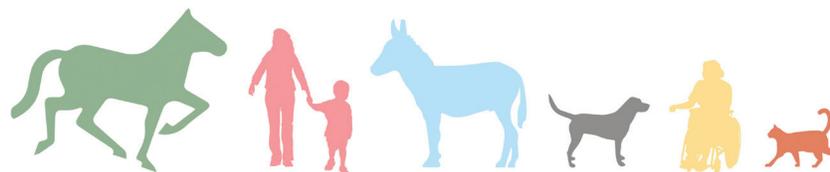
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### Cover Page Footnote

Acknowledgments We would like to thank the anonymous participants for taking part in this study. We would also like to thank the reviewer for their constructive feedback.



## Farmyard Animal or Best Friend? Exploring Predictors of Dog vs. Pig Pet Speciesism

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**Keywords:** pet speciesism, dog, pig, warmth, competence

**Abstract** Despite dogs' and pigs' shared similarities, previous research indicates people favor dogs over pigs (known as "pet speciesism"). While pet speciesism has been empirically supported, little is known about its predictors. This gap in the literature is problematic as urgent requirements to decrease meat consumption emphasize the pressing need to develop interventions to reduce pet speciesism and thus reduce meat consumption. However, to develop these interventions, we must first identify why people view pigs (vs. dogs) negatively. To begin addressing this gap, the current study utilized the stereotype content model to uniquely explore pet speciesism's predictors. We recruited participants via social media, posters, flyers, and the university's Sona system, resulting in a total of 232 participants (all 18+; Mage = 28.57, SDage = 10.74; 61.2% meat consumers; 78.4% female; 45.3% British). Behavioral and subjective self-relevance, familiarity, similarity and pet status of an animal, alongside overall empathy toward animals, differentially predicted dogs' and pigs' perceived warmth and competence and may usefully explain pet speciesism. These predictors should be investigated causally in experiments. Both the current study and later experiments could explain why people exhibit prejudice in favor of dogs and against pigs, with unique theoretical implications for pet speciesism literature and practical implications for meat consumption, policies, and public perceptions of pigs.

### Introduction

Dogs and pigs share multiple similarities: They are both omnivorous quadruped mammals with similar behaviors and appearances compared to other species, alongside similar levels of intelligence, emotion-

ality, and sociability (Lea & Osthaus, 2018; Marino & Colvin, 2015). As dogs and pigs share many characteristics, people should hypothetically view them in psychologically similar (positive) ways. For instance, people empathize more with mammals than non-mammals (e.g., birds; Prguda & Neumann, 2014;

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Westbury & Neumann, 2008) and prefer animals that share biological and behavioral characteristics with humans (“biobehavioral similarity”; Batt, 2009).

Yet despite these shared characteristics, people in Western cultures<sup>1</sup> typically view dogs positively and pigs negatively (Caviola & Capraro, 2020; Gradidge et al., in press), a phenomenon called “pet speciesism”: prejudice against typical nonpet animals (e.g., pigs) and in favor of typical pet animals (e.g., dogs; Caviola & Capraro, 2020). Pet speciesism is a form of speciesism: prejudice against some species and in favor of others, based on taxonomic classification alone (Singer, 1995). While pet speciesism differs from anthropocentric speciesism (prejudice against all animals and in favor of humans), research has predominantly investigated anthropocentric instead of pet speciesism (Gradidge & Zawisza, 2021). Thus, research on pet speciesism is sorely needed to explore how and why people view certain species (e.g., dogs) favorably and others (e.g., pigs) unfavorably.

Current research indicates pig vs. dog pet speciesism (hereon pet speciesism) occurs across various psychological dimensions, including affective components (empathy; Gradidge et al., in press; liking; Caviola & Capraro, 2020), behavioral intentions (willingness to help; Gradidge et al., in press), perceptions of animal victims (victim derogation; Gradidge et al., in press), perceptions of perpetrators of crimes against animal victims (secondhand forgiveness; Gradidge et al., in press), and mind attribution (emotional attribution; Bilewicz et al., 2011). Specifically, people empathize more with and are more willing to help a dog (vs. pig) kidnapping victim, while expressing more victim derogation and greater secondhand forgiveness (forgiving the perpetrator) for pig (vs. dog) victims (Gradidge et al., in press). People also like dogs more than pigs (Caviola & Capraro, 2020) and attribute greater emotional capabilities to dogs (Bilewicz et al., 2011).

Pet speciesism is also evident in the real world. In the United Kingdom, 33% of households have a dog (Bedford, 2021), whereas pigs are not legally recognized as pets and are subject to the same legal requirements as pigs kept for food production (Department for Environment, Food & Rural Affairs

[DEFRA] and Animal and Plant Health Agency [APHA], 2014). Furthermore, thousands of pigs in the United Kingdom are slaughtered for meat each month (e.g., 941,000 in June 2022; DEFRA, 2022), while dog meat consumption is illegal. Thus, concern for some animals (e.g., dogs) and not others (e.g., pigs) has moral implications for policy (e.g., the animals people are legally allowed to consume vs. not), meat consumption, and, ultimately, animal welfare and the environment. For instance, people tend to deny the mental capabilities (e.g., capacity to suffer, intelligence, capacity for emotion) and moral status of “food” animals (e.g., Bratanova et al., 2011; Loughnan et al., 2010), and this denial of mind and lack of moral status in turn justifies people consuming them (Gradidge et al., 2021). As meat consumption necessarily involves animal slaughter, this finding indicates that our lack of moral concern for “food” (vs. non-“food”) animals has real-world negative consequences for animal welfare, and thus that speciesism is morally unethical. Bolstering this moral argument against speciesism, meat consumption also has negative environmental consequences. For example, if most people adopted predominantly plant-based diets by 2050, greenhouse gas emissions could be reduced by 52% (Springmann et al., 2018). Thus, if people exhibited less speciesism and instead cared equally and positively for all animals, dire negative environmental consequences from meat consumption could be avoided.

Concern for some animals over others also has wider effects beyond meat consumption. For example, when pigs are victims of crime, people are more likely to derogate them (ignore their positive qualities) or forgive their perpetrators, and less likely to help them or empathize with them, than dog victims (Gradidge et al., in press). Thus, people may be less responsive to certain animal victims over others because of underlying pet speciesism, which may have real-world negative implications for certain species when they are victims. These consequences emphasize the urgent need to develop interventions to reduce pet speciesism. However, to develop these interventions, we must first identify *why* people view pigs (vs. dogs) negatively.

One reason as to why people view pigs (vs. dogs) negatively is that, despite multiple similarities, both species also have key *dissimilarities*. For example, research indicates that dogs and humans have co-evolved for approximately 32,000 years (Wang et al., 2013). Dogs have also evolved unique physiological and behavioral characteristics (e.g., an inner eyebrow muscle; Kaminski et al., 2019) absent in other species such as pigs. These characteristics enable dogs to be intrinsically appealing to humans due to their humanized facial expressions (Kaminski et al., 2017), responsiveness (Pérez Fraga et al., 2021), and cuteness, which resembles human infants (paedomorphism; Archer & Monton, 2011; Kaminski et al., 2019).

Yet, despite these intrinsic differences between dogs and pigs, dogs are not universally liked across cultures and history. For example, both Islam and Judaism typically have ambivalent views of dogs, including viewing dogs as dirty and impure (Berglund, 2014; Berkowitz, 2019), and dogs are killed for meat, physically beaten, and frequently not treated like pets in some cultures (Gray & Young, 2011). The idea of dogs as pets (that is, solely companions that are not kept for functional purposes) is also a relatively recent phenomenon in history (Herzog, 2014). Perceptions of dogs can be ambivalent even within modern “pet-loving” countries. An estimated 3% of people from the United Kingdom are very afraid of dogs while another 11% are a little afraid of dogs (YouGov, 2014). In addition, pigs are not universally disliked, as demonstrated by the trend of so-called “miniature pigs” being kept as pets. Combined with the fact that social psychological research consistently finds that people view humans (e.g., sexism; Glick et al., 2000) and even nonhumans (e.g., robots; Deligianis et al., 2017) in prejudiced ways, these differing perceptions of dogs and pigs suggest a wider explanation than intrinsic evolutionary factors alone. That is, this prior research suggests a role for extrinsic factors (characteristics imposed onto animals by humans) in pet speciesism *in combination with* intrinsic factors (characteristics inherent to the animal; Serpell, 2004). While previous research has explored intrinsic factors (as seen from the research

above), research lags behind on extrinsic factors explaining pet speciesism.

Psychological theories such as the stereotype content model (Fiske, 1998; Fiske et al., 1999), which measures stereotypes and prejudice against and toward groups, provide a possible framework to explore pet speciesism and these extrinsic factors. The stereotype content model suggests people’s perceptions of others consist of two psychological dimensions: warmth and competence (Fiske, 1998; Fiske et al., 1999). Warmth refers to whether another being (such as an animal) is viewed as having positive or negative intent. In animals, warmth may be reflected in an inclination toward friendliness or aggression (Sevillano & Fiske, 2016). Competence refers to whether this being (e.g., an animal) is viewed as capable of enacting this intent. In animals, competence may be reflected in an animal’s capacity to engage in friendly (e.g., wagging tail; initiating play) or aggressive (e.g., biting) behavior (Sevillano & Fiske, 2016). Species are categorized as warm and competent (“companions,” e.g., dogs), warm but not competent (“prey,” e.g., pigs), competent but not warm (“predators,” e.g., lions), or neither warm nor competent (“pests,” e.g., rats; Sevillano & Fiske, 2016). People are also more willing to actively help, and less willing to actively harm, “warm” species, and more willing to passively help, and less willing to passively harm, “competent” species (Sevillano & Fiske, 2016), known as the behaviors from intergroup affect and stereotypes map (Cuddy et al., 2007). These findings therefore emphasize how enhancing warmth and competence perceptions of animals can improve behavioral intentions toward them.

As the stereotype content model applies to animals, it represents a robust psychological framework with which to explore pet speciesism, whereby greater perceived warmth and/or competence of dogs (vs. pigs) indicates pet speciesism. The current study also utilizes the stereotype content model to explore extrinsic predictors of pet speciesism, thus beginning exploration of extrinsic factors that cause pet speciesism. Speciesism and general social psychological literature provide possible extrinsic factors, which we discuss below.

### *Familiarity*

Social psychological literature (e.g., Pettigrew & Tropp, 2006) has extensively explored how interpersonal and intergroup familiarity with others affects perceptions of them, whereby familiarity in this context refers to quantity or perceived quality of contact with others (Auger & Amiot, 2016). Interpersonally, people typically prefer others who are deemed familiar to oneself (Reis et al., 2011). For instance, people view familiar (vs. unfamiliar) human faces as more likeable (Harmon-Jones & Allen, 2001). At the intergroup level, familiarity can also have positive effects. For instance, direct contact with human outgroups (Pettigrew & Tropp, 2006) or mere exposure to faces of outgroup members (Flores et al., 2018) can reduce prejudice. These findings arise from two theories: intergroup contact theory (Pettigrew, 1998) and mere exposure effect (Zajonc, 1968). Intergroup contact theory suggests (positive) contact has beneficial effects as it reduces negative, and enhances positive, affect (Tausch & Hewstone, 2010). Specifically, outgroup contact reduces anxiety by enabling people to realise the outgroup is not threatening (Pettigrew & Tropp, 2008), and increases outgroup-directed empathy and perspective-taking through intergroup friendship (Pettigrew & Tropp, 2008).

Conversely, the mere exposure effect suggests multiple exposures to a stimulus increases liking for the stimulus. Specifically, viewing a stimulus multiple times improves one's ability to recognize the stimulus (Bornstein & D'agostino, 1992, 1994), which is interpreted as a positive experience and incorrectly attributed to the stimulus as liking (Bornstein & D'agostino, 1992, 1994).

Corroborating these theories, anthrozoological research (the study of human–animal interaction) indicates familiarity also has positive effects on perceptions of animals. For example, imagining interacting with a dog or cow increases inclusiveness of animals into the self and more positive behavioral intentions toward animals (Auger & Amiot, 2019a). Other research also suggests positive relationships between familiarity and perceptions of animals. For instance, pet owners (vs. nonowners) identify more

strongly with animals (Auger & Amiot, 2015), while greater contact with animals, especially pets, predicts greater identification with animals (Auger & Amiot, 2016). Additionally, 33% of United Kingdom households share their homes with dogs (Bedford, 2021) and interact with dogs frequently (unlike with pigs), supporting a role of intergroup contact theory and familiarity with perceptions of dogs.

### *Similarity*

Like familiarity, at the interpersonal level, people typically prefer others who are deemed similar to oneself (e.g., Montoya et al., 2008). For example, greater perceived similarity of another to an observer improves observers' perceptions of them (e.g., reduced victim culpability; Miller et al., 2011; increased attribution of secondary emotions; Rodríguez-Pérez et al., 2011). However, social psychological research on *intergroup* similarity with humans is contradictory. Some theories (e.g., self-categorization theory; Turner et al., 1987) and research (McDonald et al., 2015) suggest intergroup similarity positively affects perceptions of outgroups (“reflective distinctiveness”). However, other theories (e.g., social identity theory; Tajfel & Turner, 1979) and research (Danyluck & Page-Gould, 2018) indicate intergroup similarity has *negative* effects (“reactive distinctiveness”).

Anthrozoological research overwhelmingly supports positive effects of similarity on perceptions of animals (i.e., “reflective distinctiveness”). For instance, greater human–animal similarity reduces animal-directed prejudice (Costello, 2008), and people prefer (Batt, 2009; Kozachenko & Piazza, 2021) and empathize more with (Prguda & Neumann, 2014; Westbury & Neumann, 2008) species with greater biobehavioral similarity to humans. Thus, unlike with human outgroups, reflective (vs. reactive) distinctiveness is seemingly the predominant response to animals' perceived similarity. Research also indicates that people are more likely to attribute uniquely human emotions to members of their ingroup (vs. outgroup) (Cortes et al., 2005), and that dogs are typically viewed by people as part of their ingroup (“psychological-kin”; Topolski et al., 2013).

### *Categorization*

Another possible predictor of pet speciesism is categorization (Bratanova et al., 2011), whereby people place animal species into different groups, such as “pets,” “profit” animals, and “pests” (Signal et al., 2018; Taylor & Signal, 2009). People usually value pet welfare more than profit or pest animal welfare (Hazel et al., 2011; Signal et al., 2018; Taylor & Signal, 2009), representing a possible human-imposed hierarchy of animal groups. These labels have significant implications for perceptions of animals and thus possibly animal welfare. For instance, merely classifying an animal as “food” vs. “not food” (manipulating profit status) negatively influences its perceived moral status, ability to suffer, and mind attribution (e.g., Bastian et al., 2012; Bratanova et al., 2011). As people typically consume pigs as meat and keep dogs as pets within Western societies, pigs should be typically viewed as “profit” animals while dogs should be categorized as “pet” animals.

### *Self-Relevance*

Drawing on speciesism literature, another possible predictor of pet speciesism is self-relevance: whether or how much someone exploitatively uses, and is invested in using, an animal for personal benefit (e.g., for meat-eating, animal testing, bullfighting consumption; Piazza & Loughnan, 2016) with no or little benefit to the animal. For example, if someone consumes dried beef (vs. dried nuts), they view cows as having decreased moral status and feel reduced responsibility to feel moral concern for animals (Loughnan et al., 2010). Furthermore, when an animal is not self-relevant, its purported intelligence informs its perceived moral status, whereby more intelligent animals are perceived as having greater moral status (Piazza & Loughnan, 2016). However, a *self-relevant* animal’s (e.g., pig’s) purported intelligence does not inform its moral status. That is, the moral status of self-relevant animals is unaffected by whether the animal is labeled “intelligent” or “unintelligent” (also see Gradidge & Zawisza, 2019). This finding arises from “motivated cognition”: People

wish to avoid harming self-relevant animals, yet consuming them inevitably causes harm, so people intentionally evaluate self-relevant animals negatively (dehumanization; Bandura, 1999; Bilewicz et al., 2011) to reduce discomfort (see Gradidge et al., 2021, for detailed discussion).

While this previous research indicates consumption of an animal harms perceptions of it, research has not considered alternative sources of self-relevance, such as liking for meat or subjective involvement. We therefore distinguish here between two possible types of self-relevance: “behavioral self-relevance,” referring to behavioral investment in meat consumption (e.g., actual meat consumption), and “subjective self-relevance,” referring to psychological investment in meat consumption (e.g., liking for meat or product involvement). While research has not yet explored subjective self-relevance specifically, “meat paradox” research (whereby people simultaneously love animals *and* love consuming them) suggests liking for meat impacts perceptions of animals. For example, people often present meat consumption as pleasurable or “nice” (e.g., Macdiarmid et al., 2016; Piazza et al., 2015), and the more people enjoy meat, the more they deny animal suffering and defensively legitimize meat consumption (Monteiro et al., 2017), indicating motivated cognition. While “niceness” of meat is typically an outcome of motivated cognition (Piazza et al., 2015), “niceness” could equally trigger motivated cognition, whereby people who enjoy and are more (vs. less) involved in consuming meat struggle to reduce meat consumption more and thus are more motivated to dehumanize meat animals. Expanding on the above research, we aim to explore the applicability of behavioral self-relevance (behavioral investment) to pigs specifically and subjective self-relevance (psychological investment) to any species.

### *Individual Differences*

Pet speciesism may differ across individuals. That is, individual differences, including empathy toward animals (Powell, 2010) and support for animal utility (approval of using animals for human benefit;

Kendall et al., 2006), may moderate pet speciesism. For instance, greater belief in human over animal supremacy and usage of animals is associated with more negative perceptions of animals (Monteiro et al., 2017), especially lower-status “food” animals (Krings et al., 2021). Conversely, empathy toward animals is associated with more positive views of them (Hills, 1995), reduced meat consumption (Camilieri et al., 2020), increased reported meat avoidance (Rothgerber & Mican, 2014), reduced willingness to consume meat (Kunst & Hohle, 2016; Zickfeld et al., 2018), increased willingness to try a vegetarian alternative (Kunst & Hohle, 2016), and greater perceived human–animal similarity (Rothgerber & Mican, 2014). Extending the above research to the stereotype content model for the first time, we explore the applicability of these individual differences variables to pet speciesism.

## Research Questions and Hypotheses

Overall, the current study aims to extend previous pet speciesism literature by uniquely testing pet speciesism within the stereotype content model framework. It also aims to elucidate predictors of pet speciesism for the first time, which can be tested causally in later experiments. The current study therefore asks two research questions: (1) Are dogs viewed with greater warmth and competence than pigs (pet speciesism)? (2) What predicts pet speciesism?

Following from the above literature review, we propose the following hypotheses:

- H1:** Dogs will be deemed warmer (**a**) and more competent (**b**) than pigs based on previous pet speciesism research (Bilewicz et al., 2011; Caviola & Capraro, 2020; Gradidge et al., in press).
- H2:** Dogs will be deemed more familiar than pigs.
- H3:** Greater familiarity with dogs (**a**) or pigs (**b**) will predict that species’ improved warmth and competence.
- H4:** Dogs will be deemed more similar to humans than pigs.

- H5:** Greater perceived similarity of dogs (**a**) or pigs (**b**) will predict that species’ improved warmth and competence.
- H6:** Pigs will be deemed profit animals more than dogs.
- H7:** Dogs will be deemed pets more than pigs.
- H8:** The more dogs (**a**) or pigs (**b**) are categorized as pets, the warmer and more competent that species will be deemed.
- H9:** The more dogs (**a**) or pigs (**b**) are categorized as profit animals, the less warm and competent that species will be deemed.
- H10:** The more often people consume pig meat (behavioral self-relevance; **a**) and the more people are psychologically invested in consuming pig meat (subjective self-relevance; **b**), the less they will rate pigs as warm or competent.
- H11:** The more empathy people have for animals, the warmer and more competent dogs and pigs will be deemed.
- H12:** The higher the support for animal utility, the less warm and competent dogs and pigs will be deemed.

## Method

### Participants

A volunteer sample of 276 participants were recruited for this online study through social media, posters, flyers, and the Anglia Ruskin University Sona system. Thirty-nine partial responses were excluded and a further five excluded for failing an attention check, leaving a final sample of 232 participants (all 18+;  $M_{\text{age}} = 28.57$ ,  $SD_{\text{age}} = 10.74$ ). This sample size exceeds the minimum required sample size of 184 per G\*Power (effect size of 0.15, power of 0.95, 12 predictors, and a error rate of 0.05), indicating sufficient statistical power. Anglia Ruskin University undergraduate psychology students ( $n = 13$ ) received 0.25 Sona research participation credits as reimbursement. There was no other participant reimbursement.

This sample consisted of 61.2% ( $n = 142$ ) meat consumers, 13.4% ( $n = 31$ ) vegans, 12.5% ( $n = 29$ ) vegetarians, 7.8% ( $n = 18$ ) pescatarians, 2.2% ( $n = 5$ ) flexitarians (those who consume meat occasionally), 0.9% ( $n = 2$ ) meat consumers but who do not consume pig meat, and 0.4% ( $n = 1$ ) following a Mediterranean diet (which may or may not include meat). Additionally, 1.3% ( $n = 3$ ) indicated they would rather not say and 0.4% ( $n = 1$ ) gave no response. There were a significant number of non-meat consumers in comparison to the general population<sup>2</sup> as we oversampled this group in order to conduct separate analyses across meat consumers vs. non-meat consumers. However, as we were unable to recruit sufficient numbers of non-meat consumers for these separate analyses, we instead conducted all analyses on the entire sample to maximize statistical power. Controlling for diet by dummy coding the sample into meat consumers ( $n = 142$ ) and non-meat consumers (including vegans, vegetarians, and pescatarians;  $n = 78$ ) did not amend the main conclusions (see note 3).

The majority (78.4%) of the sample was female ( $n = 182$ ), followed by males at 17.7% ( $n = 41$ ), people who would rather not say at 1.7% ( $n = 4$ ), those who are nonbinary at 1.3% ( $n = 3$ ), one participant who indicated other (0.4%), and another who gave no response (0.4%). Most of the sample identified their nationality as British or American (see Table 1 for all nationalities).

Most participants identified their ethnicity as White (75.9%;  $n = 176$ ), followed by Asian (12.9%;  $n = 30$ ), mixed (5%;  $n = 12$ ), Black (3.1%;  $n = 7$ ), Arab (0.9%;  $n = 2$ ), and Hispanic and/or Latino (0.9%;  $n = 2$ ). Two participants (0.9%) indicated they would rather not say and one participant gave no response (0.4%). Additionally, most participants reported living in the United Kingdom (56.9%;  $n = 132$ ) or the United States (15.1%;  $n = 35$ ; see Table 2 for country of residence).

## Design

The current study follows a regression design with 12 predictor variables: behavioral and subjective

self-relevance of pigs, familiarity, similarity, pet status and profit status of dogs and pigs, empathy toward animals, and support for animal utility. The four outcome variables are dogs' warmth, dogs' competence, pigs' warmth, and pigs' competence. Perceptions of dogs and pigs are analysed separately to gauge if and how perceptions differ across species. This study received ethical approval from the lead authors' institutional review board (Anglia Ruskin University, ethics code EHPGR-20).

## Materials

**Empathy Toward Animals** Empathy toward animals was measured with the Empathy Towards Animals Scale (Powell, 2010, adapted from the Interpersonal Reactivity Index; Davis, 1983) consisting of two subscales: perspective-taking ( $\alpha = 0.71$  for males;  $\alpha = 0.75$  for females; Davis, 1980) and empathic concern ( $\alpha = 0.68$  for males;  $\alpha = 0.73$  for females; Davis, 1980). Participants rated their agreement or disagreement with the 12 items on a Likert scale from one ("not at all") to five ("very much"), with higher scores indicating greater empathy. A sample item is "I often have tender, concerned feelings for animals who suffer misfortune." The Interpersonal Reactivity Index from which the current scale was adapted has good test-retest reliability (0.61–0.79 for males; 0.62–0.81 for females; Davis, 1980) and good convergent and discriminant validity (Davis, 1983). Our reliability analysis indicated acceptable reliability ( $\alpha = 0.86$ ; 95% CI [0.84, 0.89]). Statements 2, 4, 5, and 10 were reverse scored. As the empathic concern and perspective-taking subscales correlated together,  $r = 0.5$ ,  $p < 0.001$ , all items were summed to create an overall empathy toward animals score.

**Attention Check** A single item was included as an attention check: "If you are reading this statement, please choose option 3 'Somewhat'." Five participants failed this check and were excluded from analyses.

**Support for Animal Utility** Support for animal utility was measured through the Animal Utility

**Table 1.** Participant Nationality

Nationality	Number of Participants (Percentage of Sample)	Nationality	Number of Participants (Percentage of Sample)
British	105 (45.3%)	Asian (nonspecified)	1 (0.4%)
American	27 (11.6%)	Australian	1 (0.4%)
Malaysian	10 (4.3%)	Dual British and Asian (nonspecified)	1 (0.4%)
Portuguese	10 (4.3%)	Dual British and Canadian	1 (0.4%)
French	7 (3%)	Dual British and U.S. American	1 (0.4%)
German	7 (3%)	Dual Mexican and U.S. American	1 (0.4%)
No response or not applicable	6 (2.6%)	Indonesian	1 (0.4%)
Canadian	3 (1.3%)	Israeli	1 (0.4%)
Chinese	3 (1.3%)	Japanese	1 (0.4%)
Dutch	3 (1.3%)	Kazakh	1 (0.4%)
Hungarian	3 (1.3%)	Maldivian	1 (0.4%)
Indian	3 (1.3%)	Maltese	1 (0.4%)
Irish	3 (1.3%)	Myanmarese	1 (0.4%)
Italian	3 (1.3%)	New Zealander	1 (0.4%)
Romanian	3 (1.3%)	Norwegian	1 (0.4%)
South African	3 (1.3%)	Palestinian	1 (0.4%)
Czech	2 (0.9%)	Serbian	1 (0.4%)
Greek	2 (0.9%)	Swedish	1 (0.4%)
Pakistani	2 (0.9%)	Taiwanese	1 (0.4%)
Polish	2 (0.9%)	Thai	1 (0.4%)
Spanish	2 (0.9%)	Zimbabwean	1 (0.4%)
Vietnamese	2 (0.9%)		

Scale (Kendall et al., 2006). Participants rated their agreement or disagreement with three items on a Likert scale from 1 (“strongly disagree”) to 7 (“strongly agree”), with higher scores indicating greater support for animal utility. A sample item is “It is acceptable to use animals to test consumer products such as soaps, cosmetics, and household cleaners.” No items are reverse scored. The scale has good validity (Cembalo et al., 2016) and acceptable reliability ( $\alpha = 0.65$ ; Kendall et al., 2006). Our reliability analysis returned lower

reliability ( $\alpha = 0.58$ ; 95% CI [0.47, 0.66]). However lower reliabilities are not uncommon with short scales (Ponterotto & Ruckdeschel, 2007). All items were summed to form a support for animal utility score.

**Perceived Familiarity and Similarity of Dogs and Pigs** Perceived familiarity (the quantity or perceived quality of contact with dogs or pigs) and similarity (the degree to which dogs and pigs are

**Table 2.** Participant Country of Residence

Country of Residence	Number of Participants (Percentage of Sample)
United Kingdom	132 (56.9%)
United States	35 (15.1%)
Malaysia	9 (3.9%)
France	7 (3%)
Australia	5 (2.2%)
No response or not applicable	5 (2.2%)
The Netherlands	5 (2.2%)
Canada	4 (1.7%)
Germany	4 (1.7%)
Hungary	4 (1.7%)
Italy	3 (1.3%)
Ireland	2 (0.9%)
Norway	2 (0.9%)
South Africa	2 (0.9%)
Spain	2 (0.9%)
Sweden	2 (0.9%)
Austria	1 (0.4%)
Belgium	1 (0.4%)
Finland	1 (0.4%)
Hong Kong	1 (0.4%)
Kazakhstan	1 (0.4%)
Serbia	1 (0.4%)
Singapore	1 (0.4%)
Switzerland	1 (0.4%)
Vietnam	1 (0.4%)

Note: Average duration for living in country of residence was 21.6 years.

viewed as akin to humans) were measured by single questions developed by the researchers: “*How familiar do you perceive the following animals (dogs/pigs) to be to you?*” and “*How similar do you perceive the following animals (dogs/pigs) to be to humans?*” on a Likert scale from

1 (“*not at all*”) to 5 (“*very much*”). Higher scores indicate greater familiarity and similarity respectively.

### Perceived Pet and Profit Status of Dogs and Pigs

Perceived pet and profit status were measured by single questions developed by the researchers: “*How much do you perceive the following animals (dogs/pigs) to be a ‘pet’ animal (an animal that is kept within a household as a companion)?*” and “*How much do you perceive the following animals to be a ‘profit’ animal (an animal that is used in some way for human consumption, e.g., for meat, leather or animal testing)?*” on a Likert scale from 1 (“*not at all*”) to 5 (“*very much*”). Higher scores indicate greater pet or profit status respectively.

### Subjective Self-Relevance of Pigs

Subjective self-relevance was measured through an adapted version of the Product Involvement Scale (Jain & Srinivasan, 1990; Kim, 2006; Luna & Kim, 2009) regarding participants’ perceptions of pig products (e.g., ham). Participants rated their agreement or disagreement with three items on a Likert scale from 1 (“*strongly disagree*”) to 7 (“*strongly agree*”), with higher scores indicating greater subjective self-relevance of pigs. We adapted these items from an Osgood differential scale (Luna & Kim, 2009) to a noncomparative Likert scale referring to pig products specifically (e.g., “*I am very interested in products made from pigs (e.g., pork, ham)*”). No items are reverse scored. The original scale had high reliability ( $\alpha = 0.86$ ; Kim, 2006), yet reliability on our sample was considerably lower ( $\alpha = 0.69$ ; 95% CI [0.61, 0.75]). Further analyses revealed that item 3 “*I am not indifferent to products made from pigs (e.g., pork, ham)*” correlated poorly with the first,  $r = 0.28$ , and second items,  $r = 0.26$  (Field, 2018), and removing this item improved scale reliability ( $\alpha = 0.85$ ; 95% CI [0.81, 0.89]). We thus excluded this item and summed the remaining two items to create a subjective self-relevance score.

### Behavioral Self-Relevance of Pigs

Behavioral self-relevance was measured by a single question: “*How many days a week do you eat products made from pigs (e.g., ham, pork, sausages, bacon)?*” from 0 to 7 days per week. Higher scores indicate greater behavioral self-relevance.

### Perceived Warmth and Competence of Dogs and Pigs

Perceived warmth and competence were measured with abridged warmth and competence subscales (Sevillano & Fiske, 2016). Participants rated how much they perceived dogs and pigs as “warm,” “well-intentioned,” and “friendly” (warmth subscale) and “competent,” “skillful,” and “intelligent” (competence subscale) on a Likert scale from 1 (“not at all”) to 5 (“extremely”). Higher scores indicate greater warmth or competence respectively. No items are reverse scored. The subscales have good discriminant and convergent validity (Diamantopoulos et al., 2017), apply across various contexts (e.g., brands, Zawisza, 2016; cross-cultural, Zawisza et al., 2018; animals, Sevillano & Fiske, 2016), and predict behavioural intentions (Cuddy et al., 2007). The subscales have high reliability (warmth:  $\alpha = 0.83$ ; competence:  $\alpha = 0.87$ ; Sevillano & Fiske, 2016), corroborated by our reliability analyses (dog warmth:  $\alpha = 0.87$ , 95% CI [0.84, 0.9]; dog competence:  $\alpha = 0.87$ , 95% CI [0.84, 0.9]; pig warmth:  $\alpha = 0.88$ , 95% CI [0.86, 0.91]; pig competence:  $\alpha = 0.9$ , 95% CI [0.88, 0.92]).

### Procedure

All participants took part online via Qualtrics. After giving informed consent, participants completed the scales in the order listed above followed by demographic questions (diet, gender, age, nationality, ethnicity, country of residence, duration of time living in country of residence). Participants then reported technical difficulties and offered comments. Seven participants reported technical difficulties, but their responses were complete and therefore included within analyses. Finally, participants were debriefed, automatically redirected to SONA, and, if applicable, received their credits.

## Results

### Analytical Strategy

We hypothesised that dogs would be viewed as warmer (**H1a**), more competent (**H1a**), more familiar to us (**H2**), more similar to humans (**H4**), less as

profit animals (**H6**), and more as pets (**H7**) than pigs. To assess these hypotheses, we therefore ran five one-way repeated measures ANOVAs with subsequent Benjamini-Hochberg corrections (Benjamini & Hochberg, 1995), with species (dog vs. pig) as the independent variable, warmth (**H1a**) and competence (**H1b**), familiarity (**H2**), similarity (**H4**), and profit status (**H6**) as the dependent variables.<sup>3</sup> All ANOVA assumptions were met or resolved. There were either no outliers (pig warmth; pig/dog competence; pig familiarity; dog/pig similarity; pig profit status) or outliers were not extreme and did not change conclusions (dog warmth; dog familiarity; dog profit status). Hence, we report analyses including outliers. While all ANOVAs failed Kolmogorov-Smirnov statistical tests of normality,  $ps < 0.05$ , skewness was acceptable (between  $-2$  to  $2$ ; Kim, 2013; West et al., 1995) and ANOVA is robust to non-normality (Blanca et al., 2017). Note that, as single Likert items can be deemed nonparametric (Bishop & Herron, 2015), three nonparametric analyses with species (dog vs. pig) as the independent variable and familiarity, similarity (Wilcoxon signed-rank tests), and profit status (sign test with continuity correction) as the dependent variables respectively revealed the same results as the ANOVAs. To assess **H7**, we ran a nonparametric sign test with continuity correction instead of one-way repeated measures ANOVA due to multiple extreme outliers and excessive negative skew on dogs’ pet status. A sign test with continuity correction was conducted instead of a Wilcoxon signed-rank test due to failure to meet the assumption of symmetrical distribution.<sup>4</sup>

To assess all of our other hypotheses, we ran multiple regressions with 12 predictors (familiarity, similarity, dogs’ and pigs’ pet and profit status, pigs’ behavioral and subjective self-relevance, empathy for animals, and support for animal utility) on each of the four outcome variables (dogs’ and pigs’ warmth and competence).<sup>5</sup> All assumptions for the regressions were met or resolved. Residuals were normally distributed, excluding outliers and leverage values did not change main findings,<sup>6</sup> there was no multicollinearity between predictors, and homoscedasticity and linearity assumptions were met. Nonparametric

ordinal logistic regressions revealed comparable results. We report the regressions including outliers and leverage values below.

**Main Analyses**

**Species Main Effects** The main effects of species on warmth, competence, familiarity, similarity, profit status, and pet status were all statistically significant (see Table 3 for inferential statistics).

Specifically, agreeing with **H1, H2, H4, and H6–H7**, dogs were deemed warmer, more competent,

more familiar, more similar, less as profit animals, and more as pet animals than pigs (see Figure 1). All findings remained statistically significant (all  $q$ -values = 0.01) after correcting for multiple comparisons using the Benjamini-Hochberg correction, which maintains the false discovery rate at 0.05.

**Predictors of Pet Speciesism (H3, H5; H8–H12)** The regression revealed that our model statistically significantly predicted all outcome variables (see Table 4). We report findings relevant to our hypotheses, alongside all unexpected

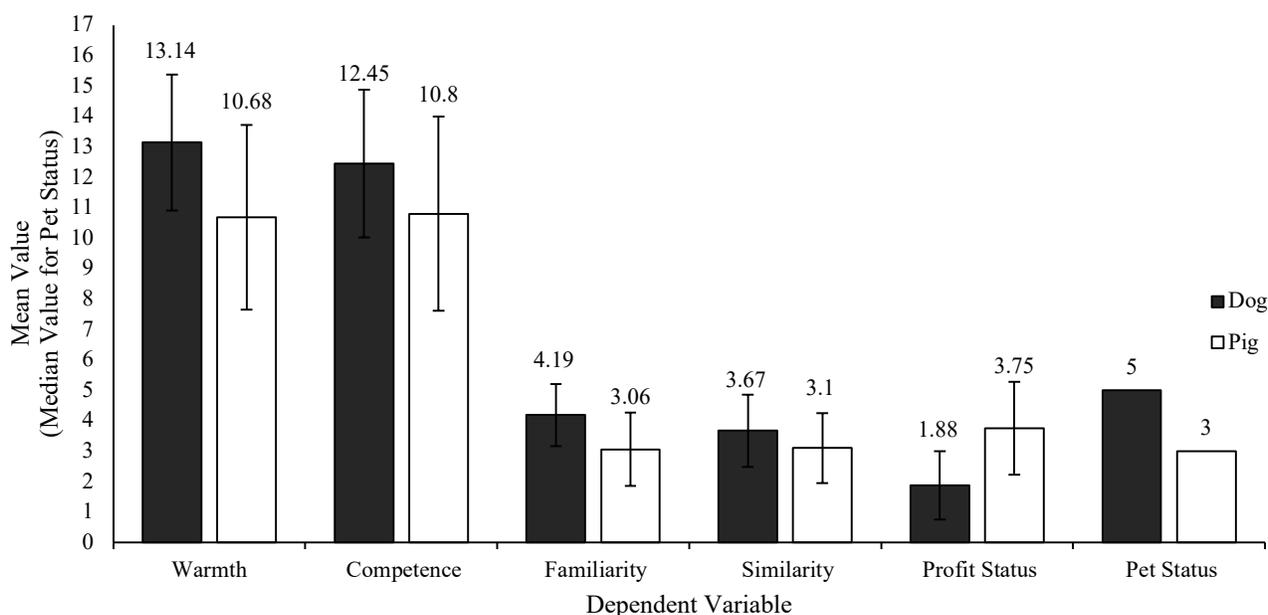
**Table 3.** ANOVA Inferential Statistics of Species on All Outcome Variables

Warmth	Competence	Familiarity	Similarity	Profit Status	Pet Status
*** $F(1, 231) = 195.81, p < 0.001,$ partial $\eta^2 = 0.46$ (large-sized) <sup>†</sup>	*** $F(1, 231) = 69.42, p < 0.001,$ partial $\eta^2 = 0.23$ (large-sized)	*** $F(1, 231) = 231.64, p < 0.001,$ partial $\eta^2 = 0.5$ (large-sized)	*** $F(1, 231) = 61.33, p < 0.001,$ partial $\eta^2 = 0.21$ (large-sized)	*** $F(1, 231) = 349.31, p < 0.001,$ partial $\eta^2 = 0.6$ (large-sized)	*** $z = 13.65,$ $p < 0.001, r = 0.9$ (large-sized) <sup>‡</sup>

Note: \* =  $p < 0.05,$  \*\* =  $p \leq 0.01,$  \*\*\* =  $p \leq 0.001$

<sup>†</sup> Effect sizes are defined throughout as approximately partial  $\eta^2 = 0.01$  (small), partial  $\eta^2 = 0.06$  (medium) and partial  $\eta^2 = 0.14$  (large; Richardson, 2011).

<sup>‡</sup> Per Cohen (1988).



**Figure 1.** Mean values for main effects of species on all dependent variables. Note: Error bars depict standard deviations. Pet status depicts median values instead of mean values.

**Table 4.** Regression Statistics

Predictor	<i>B</i>	<i>SE</i>	<i>F</i>	Partial $\eta^2$	Adj. <i>R</i> <sup>2</sup>
<i>(OV1) Dog Warmth</i>			14.36***		0.41
Pigs' Behavioral Self-Relevance	0.15	0.09	3.26	0.02	
Pigs' Subjective Self-Relevance	0.04	0.09	0.23	0.001	
Dog Familiarity	0.46	0.15	10.06**	0.04	
Pig Familiarity	-0.29	0.13	4.62*	0.02	
Dog Similarity	0.55	0.13	17.67***	0.08	
Pig Similarity	-0.17	0.14	1.32	0.01	
Dog Pet Status	0.77	0.19	15.82***	0.07	
Pig Pet Status	0.46	0.11	15.96***	0.07	
Dog Profit Status	-0.27	0.11	6.09**	0.03	
Pig Profit Status	-0.02	0.09	0.03	< 0.001	
Empathy for Animals	0.07	0.02	16.91***	0.07	
Support for Animal Utility	-0.02	0.04	0.18	0.001	
<i>(OV2) Dog Competence</i>			9.06***		0.3
Pigs' Behavioral Self-Relevance	0.05	0.1	0.27	0.001	
Pigs' Subjective Self-Relevance	0.14	0.1	1.85	0.01	
Dog Familiarity	-0.06	0.17	0.11	0.001	
Pig Familiarity	-0.15	0.16	0.85	0.004	
Dog Similarity	0.47	0.16	9.3**	0.041	
Pig Similarity	-0.2	0.17	1.37	0.01	
Dog Pet Status	0.65	0.23	7.91**	0.04	
Pig Pet Status	0.54	0.14	15.67***	0.07	
Dog Profit Status	-0.1	0.13	0.53	0.002	
Pig Profit Status	-0.19	0.11	3.19	0.01	
Empathy for Animals	0.1	0.02	24.72***	0.1	
Support for Animal Utility	-0.07	0.05	2.08	0.01	
<i>(OV3) Pig Warmth</i>			11.59***		0.36
Pigs' Behavioral Self-Relevance	0.3	0.12	6.31**	0.03	
Pigs' Subjective Self-Relevance	-0.27	0.12	4.77*	0.02	
Dog Familiarity	0.22	0.21	1.11	0.01	
Pig Familiarity	0.14	0.19	0.53	0.002	
Dog Similarity	-0.15	0.19	0.68	0.003	
Pig Similarity	0.52	0.2	6.38**	0.03	
Dog Pet Status	0.85	0.28	9.48**	0.04	
Pig Pet Status	0.71	0.16	19.03***	0.08	
Dog Profit Status	0.14	0.16	0.82	0.004	
Pig Profit Status	-0.16	0.13	1.67	0.01	
Empathy for Animals	0.06	0.02	5.99*	0.03	
Support for Animal Utility	-0.09	0.06	2.06	0.01	

Table 4. (Continued)

Predictor	<i>B</i>	<i>SE</i>	<i>F</i>	Partial $\eta^2$	Adj. $R^2$
(OV4) Pig Competence			11.99***		0.36
Pigs' Behavioral Self-Relevance	0.1	0.13	0.57	0.003	
Pigs' Subjective Self-Relevance	-0.23	0.13	3.24	0.02	
Dog Familiarity	-0.14	0.22	0.42	0.002	
Pig Familiarity	0.48	0.2	5.97*	0.03	
Dog Similarity	-0.14	0.19	0.54	0.002	
Pig Similarity	0.78	0.21	12.83***	0.06	
Dog Pet Status	0.97	0.29	11.24***	0.05	
Pig Pet Status	0.59	0.17	12.07***	0.05	
Dog Profit Status	-0.02	0.16	0.01	< 0.001	
Pig Profit Status	0.01	0.13	0.003	< 0.001	
Empathy for Animals	0.05	0.03	3.98*	0.02	
Support for Animal Utility	-0.05	0.06	0.64	0.003	

Note: \* =  $p < 0.05$ , \*\* =  $p \leq 0.01$ , \*\*\* =  $p \leq 0.001$ . OV refers to outcome variable.

statistically significant findings, below. See Table 4 for all statistics.

We hypothesized that greater familiarity with dogs (**H3a**) or pigs (**H3b**) would predict that species' greater warmth and competence. Partially supporting **H3a**, the greater the familiarity with dogs, the warmer dogs were perceived (medium-sized effect). However, contradicting **H3a**, familiarity with dogs did not statistically significantly predict dogs' competence. Additionally, the greater the familiarity with pigs, the more competent pigs were perceived (small- to medium-sized effect), partially supporting **H3b**. However, contradicting **H3b**, familiarity with pigs did not statistically significantly predict pigs' warmth. Unexpectedly, the greater the familiarity with pigs, the less warm dogs were perceived (small-sized effect).

We also hypothesized that greater perceived similarity of dogs (**H5a**) or pigs (**H5b**) to humans would predict that species' greater warmth and competence. Supporting **H5a**, the greater dogs' perceived similarity to humans, the warmer (medium- to large-sized effect) and more competent (medium-sized effect) they were deemed. Additionally, supporting **H5b**, the greater pigs' perceived similarity to humans, the

warmer (small- to medium-sized effect) and more competent (medium-sized effect) they were deemed.

We hypothesized that the more dogs (**H8a**) or pigs (**H8b**) are categorized as pets, the warmer and more competent that species will be deemed. Supporting **H8a**, the greater dogs' pet status, the warmer and more competent they were perceived (both medium-sized effects). Unexpectedly, the greater dogs' pet status, the warmer and more competent pigs were also perceived (both medium-sized effects). Additionally, supporting **H8b**, the greater pigs' pet status, the warmer (medium- to large-sized effect) and more competent (medium-sized effect) they were perceived to be. Unexpectedly, the greater pigs' pet status, the warmer and more competent dogs were also perceived to be (both medium-sized effects).

We also hypothesized that the more dogs (**H9a**) or pigs (**H9b**) are categorized as profit animals, the less warm and competent that species will be deemed. Partially supporting **H9a**, the greater dogs' profit status, the less warm they were perceived to be (small- to medium-sized effect). However, contradicting **H9a**, dogs' profit status did not statistically significantly predict dogs' competence. Additionally, contradicting **H9b**, pigs' profit status did not

statistically significantly predict pigs' warmth or competence.

We hypothesized that the more often people consume pig meat (behavioral self-relevance; **H10a**) and the more people are psychologically invested in consuming pig meat (subjective self-relevance; **H10b**), the less they will rate pigs as warm or competent. Contradicting **H10a**, the greater the behavioral self-relevance of pigs, the *warmer* pigs were deemed (small- to medium-sized effect). Also contradicting **H10a**, behavioral self-relevance of pigs did not statistically significantly predict pigs' competence. Conversely, partially supporting **H10b**, the greater subjective self-relevance of pigs, the less warm pigs were deemed (small-sized effect). However, contradicting **H10b**, subjective self-relevance of pigs did not statistically significantly predict pigs' competence.

We hypothesized that the more empathy people have for animals, the warmer and more competent dogs and pigs will be deemed (**H11**). Supporting **H11**, the greater the empathy for animals, the warmer (medium-sized effect) and more competent (medium- to large-sized effect) dogs were deemed. Additionally, also supporting **H11**, the greater the empathy for animals, the warmer (small-sized effect) and more competent (small-sized effect) pigs were deemed.

Finally, we hypothesized that the higher the support for animal utility, the less warm and competent dogs and pigs would be deemed (**H12**). Contradicting **H12**, support for animal utility did not statistically significantly predict dogs' warmth or competence, nor pigs' warmth or competence.

## Discussion

This study uniquely explored support for pet speciesism using the stereotype content model and tested predictors of pet speciesism for the first time. Specifically, the current research aimed to (a) investigate support for pet speciesism using the stereotype content model (**H1**), (b) test if dogs are deemed more familiar (**H2**), more similar (**H4**), less as profit animals (**H6**), and more as pets (**H7**) than pigs, and (c) explore possible pet speciesism predictors: familiarity (**H3**),

similarity (**H5**), pet status (**H8**), profit status (**H9**), behavioral and subjective self-relevance (**H10a–b**), empathy for animals (**H11**), and support for animal utility (**H12**).

Overall, **H1–H2**, **H4**, and **H6–H7** were supported. That is, pet speciesism was evidenced. Specifically, dogs (vs pigs) are deemed warmer, more competent (**H1**), more familiar (**H2**), and similar (**H4**), less as profit animals (**H6**), and more as pets (**H7**). Furthermore, familiarity, similarity, and pet status in turn all predicted perceptions of dogs and pigs (though in different ways; discussed below). However, while dogs' greater profit status predicted dogs' decreased warmth (but not competence), pigs' profit status predicted neither pigs' warmth nor competence. This finding contradicts **H9** and previous research (Signal et al., 2018; Taylor & Signal, 2009) and suggests profit status cannot explain pet speciesism. That is, even though pigs are deemed profit animals more than dogs, profit status does *not* predict pigs' decreased warmth and competence. Our results may differ from previous findings from Signal et al. (2018) and Taylor and Signal (2009), as this previous research did not test if the simple label and categorization (of being a pet, a pest, or a profit animal) caused speciesism. While they did find positive perceptions of pets and more negative perceptions of profit animals and pests (evidence of speciesism), it is unclear if these perceptions of different types of animals were caused by mere categorization (pet vs. profit vs. pest) or by moderating variables. For example, profit animals may not have been viewed negatively merely due to their profit status but instead due to other factors explored within the current study like less familiarity with and lower perceived similarity of profit animals to humans. Unlike profit status, familiarity (**H3**), similarity (**H5**), and pet status (**H8**) could all explain pet speciesism, though with variable effects. For instance, following previous literature (Auger & Amiot, 2015, 2016, 2019a, 2019b), we hypothesized that familiarity with a species would predict that species' greater warmth *and* competence (**H3**). Yet, partially contradicting **H3**, familiarity predicted only warmth for dogs and only competence for pigs.

This finding thus suggests possible differential relationships between familiarity and warmth vs. competence, depending on species.

Contrary to familiarity, and supporting **H5** and previous research (e.g., Batt, 2009), dogs' or pigs' greater similarity predicted that species' increased warmth and competence. This finding partially contradicts Piazza and Loughnan (2016), whereby people ignored pigs' purported intelligence when considering their moral status. However, as the current study reveals associative relationships only, similarity may not be causing increased warmth and competence. Instead, participants may be motivated to view pigs negatively and thus view pigs with decreased warmth, competence, and similarity.

Like similarity, and agreeing with **H8** and previous research (e.g., Signal et al., 2018), dogs' or pigs' greater pet status also predicted that species' increased warmth and competence. Yet, pet status also positively generalized to perceptions of the other species. That is, the more dogs or pigs were categorized as pets, the warmer and more competent the other species was perceived. This generalization effect is the "pets as ambassadors hypothesis," whereby positive perceptions of one species inform positive perceptions of another, and is supported by previous research (Auger & Amiot, 2015, 2016, 2019a, 2019b; Auger et al., 2015; Serpell & Paul, 1994). This generalization is usually from perceptions of pets to nonpets but also uniquely occurred here in the opposite direction.

Alongside the above predictors, subjective self-relevance of pigs could explain pet speciesism too. Specifically, subjective self-relevance predicted warmth (though not competence) in the expected negative direction (partially supporting **H10b**), partly agreeing with previous literature (Bastian et al., 2012; Loughnan et al., 2010; Piazza & Loughnan, 2016). Behavioral self-relevance also did not predict competence, and predicted warmth in an unexpected positive direction (contradicting **H10a**). This positive relationship may arise from a third variable. For example, participants may have deliberately underreported pig product consumption (causing low reported behavioral self-relevance, despite higher

actual behavioral self-relevance; Rothgerber, 2019) and deliberately dehumanized pigs by viewing them as lacking in warmth.

The **H11** findings indicate empathy for animals improves perceptions of dogs and pigs. This result agrees with previous literature, which suggests empathy for animals improves perceptions of them (Hills, 1995). However, it is unclear if having more empathy for animals *causes* more positive perceptions or if people who have more empathy also have more positive perceptions of animals due to another underlying variable.

Finally, contradicting **H12** and previous research (e.g., Krings et al., 2021; Monteiro et al., 2017), support for animal utility did not predict dogs' or pigs' warmth and competence. These findings suggest support for animal utility as measured within the current study does not moderate pet speciesism. This finding may contradict previous research as support for animal utility has previously been measured with various scales and under differing names (e.g., "human supremacy over animals"; Krings et al., 2021). While these variables may overlap considerably (e.g., in terms of their support for human dominion over animals), these variables may also subtly differ in their operationalization and measurement. For example, we utilized the Animal Utility Scale, which had low reliability within the current study and could therefore explain our null results. We also theorise that support for animal utility may split into utilitarian-type support (whereby people do not wish to harm animals but believe animal harm is unavoidable in order to meet human needs) and malicious-type support (whereby people feel no concern about animal harm and believe animals can be used without abandon to meet human needs). While both types of support value humans over other animals, we theorize that utilitarian-type support still assigns some value to animals, while malicious-type support does not. Subtle differences in operationalization across studies may in turn affect measurement and thus explain differing findings. Future research should carefully identify if these separate components of support for animal utility exist and, if so, develop finely tuned measurements for each.

## Limitations and Directions for Future Research

While the current study extends previous literature by evidencing pet speciesism within the stereotype content model framework and uniquely demonstrates predictors and possible causes of pet speciesism, it does have certain limitations, including noncausality, a focus on extrinsic factors only, culture-boundedness, and reliance on self-report. We discuss these limitations here and provide suggestions for future research.

One limitation is the study's correlational nature, which restricts conclusions about causality. Subsequent studies should employ experimental designs to test possible causal effects of the statistically significant predictors of pet speciesism found here. For instance, researchers could manipulate an animal's familiarity to assess causal effects on the animal's warmth and competence. If familiarity has causal effects, this finding may (1) explain why dogs are deemed warmer and more competent than pigs (as dogs are also deemed more familiar to humans than pigs) and (2) provide opportunities for interventions to improve pigs' warmth and competence (e.g., enhancing pigs' familiarity).

The research also only explores extrinsic factors and not the confluence of both extrinsic and intrinsic factors. As pet speciesism may result from both extrinsic and intrinsic factors (Serpell, 2004), we suggest that future research test the contribution of both types of factors. For example, future research could conduct a regression on all intrinsic (e.g., unchangeable behavioral and physiological characteristics) and all extrinsic (e.g., changeable perceptions of animals) variables and assess the relative contributions of each. It is also possible that intrinsic and extrinsic factors may combine to enhance or reduce pet speciesism. For example, previous research indicates that the positive effects of paedomorphism on our perceptions of animals are partially moderated by pet owner species preference and pet attachment (Archer & Monton, 2011).

Additionally, this study is culture-bounded, as reflected in the study sample. Most participants were

British or American and living in the United Kingdom or United States. While speciesism is cross-cultural (Joy, 2011), evaluations of, and interactions with, different species are culturally specified (Gray & Young, 2011). Thus, the focus on *dog* vs. *pig* pet speciesism here means our findings apply only to people from cultures that treat dogs as pets and pigs as food and thus potentially exclude certain countries and cultures. For instance, Muslims typically abstain from consuming pigs and thus may view pigs with equivalent warmth and competence as dogs. Conversely, people who follow Chinese traditions of dog meat consumption may view dogs with less warmth and competence than pigs.

However, even the above cultural hypotheses are oversimplified. For instance, as discussed in the introduction, Islam sometimes views dogs as impure (Berglund, 2014). Thus, some Muslims may not consume dogs as part of their diet because they view dogs negatively (e.g., disgust), unlike non-Muslim Westerners who do not consume dogs and view them positively (e.g., cuteness; Zickfeld et al., 2018). To complicate matters further, dog ownership in Islamic countries is increasing (Berglund, 2014). Similarly, there are growing trends within China to reject dog meat consumption (Pettier, 2020). Therefore, Muslims and Chinese people may increasingly view dogs like non-Muslim Westerners and exhibit dog vs. pig pet speciesism.

Future research should (1) generally, consider how culture influences perceptions of animals and (2) specifically, test the conflicting cultural hypotheses here: Do Muslims view dogs more negatively (due to perceived impurity) and/or pigs more positively (due to no self-relevance) than non-Muslim Westerners? Do Chinese (vs. Western) people view dogs more negatively than pigs due to self-relevance, or just as positively due to increasing rejection of dog meat? These questions are important for understanding pet speciesism in a non-Western context and determining cultural boundary conditions of (dog vs. pig) pet speciesism.

Finally, the study relies on self-report, which may lead to biases in participant responses. For example, people can underreport or otherwise misrepresent their meat consumption when asked about it directly (Rothgerber, 2019). Thus, our measure of behavioral

self-relevance (asking participants directly about their weekly meat consumption) may not reflect participants' true meat consumption and instead reflect a more socially desirable response of less meat consumption (Rothgerber, 2019). Future research may instead employ more subtle measurements of behavioral self-relevance such as using food diaries (Gradidge et al., 2021).

## Theoretical Implications

The current study has strong theoretical implications for pet speciesism literature by (1) supporting pet speciesism within novel psychological dimensions (warmth and competence), thus building upon previous support for pet speciesism (e.g., Caviola & Capraro, 2020; Gradidge et al., in press), and (2) uniquely evidencing pet speciesism's predictors, thus extending previous pet speciesism literature by beginning to identify why pet speciesism occurs. The current study also provides a strong foundation for subsequent experiments to test the causality of these predictors and use statistically significant causes to inform interventions to reduce pet speciesism. Our findings contribute to and extend social psychological literature (e.g., Sevillano & Fiske, 2016) by demonstrating applicability of the stereotype content model to perceptions of animals and uniquely evidencing the utility of the stereotype content model as a framework for measuring pet speciesism. Moreover, our paper adds to previous literature (e.g., Auger & Amiot, 2019a) by showing how some psychological concepts developed with perceptions of humans (e.g., familiarity; Pettigrew & Tropp, 2006) also apply to perceptions of animals, indicating these concepts extend beyond perceptions of humans only.

## Summary for Practitioners: Practical Implications

This study has strong practical implications for human–animal interaction practitioners. For instance, if familiarity causes pet speciesism, inter-

ventions may utilize actual or imagined interaction (Auger & Amiot, 2019a) with pigs to improve pigs' perceived warmth and/or competence. Alternative possible interventions from the current study also include: (1) reducing pigs' subjective self-relevance by decreasing the salience of people's liking for pig meat or focusing on negative aspects of pig meat (e.g., eliciting disgust) or (2) utilizing “factual appeals” (highlighting similarities of pigs to humans). However, these factual appeals may be ineffective for pigs (see Gradidge & Zawisza, 2019, for a discussion).

Extending the stereotype content model, the behaviors from the intergroup affect and stereotypes map (Cuddy et al., 2007) suggests warmth and competence inform behavioral intentions (and ultimately behavior) toward others. Thus, improving pigs' warmth and competence through possible effective interventions described above should encourage more positive (active and passive help), and less negative (active and passive harm), behaviors towards pigs, such as reduced willingness to consume pig meat. This possible reduced meat consumption would benefit both human and animal welfare by aiding the global mission to decrease greenhouse gas emissions (Springmann et al., 2018), and would benefit pig welfare specifically through reducing harm caused to pigs (e.g., through slaughter).

Beyond meat consumption, interventions could also have practical implications for enhancing public perception of pigs and improving (non-meat-related) behavior toward them. For instance, both the current study and previous research (Gradidge et al., in press) indicate people respond less favorably to pigs (vs. dogs) in the real world, meaning people may experience more apathy and less moral outrage when pig (vs. dog) welfare is violated. Policymakers may also view pigs negatively, meaning policies affecting pigs may be less considerate of animal welfare than policies affecting dogs. This disparity in policies is already evident in the United Kingdom, whereby, despite dogs' and pigs' multiple similarities, dog meat consumption is illegal, yet thousands of pigs are slaughtered for food monthly (DEFRA, 2022).

Interventions to improve pigs' warmth and competence, and thus improve behavioral intentions toward

them, may enable these real-world issues regarding policy and public perception of pigs to be overcome. Specifically, if policymakers have more positive behavioral intentions toward pigs, then pig welfare may be indirectly enhanced through improvements to policy that prevent (e.g., stopping pig slaughter) or mitigate (e.g., implementing further measures to reduce distress during slaughter) harm against pigs. More positive public perception of pigs may also have wide-ranging consequences that better pig welfare,<sup>7</sup> possibly including exerting pressure on policymakers, raising awareness of pig welfare issues to others, widespread reductions in personal meat consumption, revealing and publicizing cases of pig welfare violations, and pressuring pig slaughter organizations (e.g., factory farms) to comply with animal welfare legislation through measures such as boycotting.

Finally, where opportunity allows (e.g., at animal sanctuaries), improving perceptions of pigs may also foster positive human–animal interactions between humans and pigs. While research exploring the effects of positive human–animal interactions on well-being is mixed (e.g., Rodriguez et al., 2021), positive human–animal interactions between humans and pigs may at least be a prerequisite for human–pig bonds. Thus, improving warmth and competence perceptions of pigs may represent the initial stepping-stone to enable potentially deeper human–pig bonds to be formed.

Overall, the current study is of practical use to human–animal interaction practitioners as it begins the journey to identifying which variables predict pet speciesism, and which variables may therefore be effective within interventions to enhance perceptions of pigs. These interventions in turn have indirect implications for both pig and human welfare. Such interventions may also foster positive human–pig interactions and relationships.

## Conclusion

To conclude, the current research suggests pet status, similarity, familiarity, empathy toward animals, and (behavioral and subjective) self-relevance, but not

animal utility, all predict perceptions of dogs and pigs and potentially cause or moderate pet speciesism. Animal utility's lack of predictive effects, and profit status's lack of predictive effects on perceptions of pigs, indicate neither variable can explain pet speciesism. Thus, the current research uniquely highlights predictors of pet speciesism. This research adds to emerging pet speciesism literature and extends established social psychological literature by further demonstrating the applicability of concepts developed with perceptions of humans to perceptions of animals. Future research should assess these predictors' causal effects and utilize statistically significant causes to inform interventions to reduce pet speciesism. This research is especially important and urgent due to required reductions in meat consumption and has strong practical implications for meat consumption, public perception of pigs, and policy.

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## Notes

1. This paper refers to psychological phenomena in Western cultures throughout unless otherwise specified.
2. Vegans and vegetarians typically make up approximately 1% and 7% of the population respectively (Wunsch, 2021), although these figures vary (e.g., by country).
3. Note that running all ANOVAs instead as ANCOVAs, which controlled for diet (except pet status; see note 4), did not change findings. We therefore report the original ANOVAs here, which did not control for diet.
4. An ANCOVA controlling for diet could not be run for pet status as this variable failed ANOVA assumptions and diet cannot be controlled for with a nonparametric sign test.
5. Due to the presence of four outcome variables, we ran these multiple regressions as a multivariate multiple regression via SPSS's general linear model menu option instead of via the regression menu option per IBM's

guidance (IBM, 2020). However, we only report the univariate statistics here. Including diet as a covariate within these analyses did not change findings except for pig familiarity no longer predicting dogs' warmth,  $p = 0.06$ ,  $B = -.26$ ,  $SE = 0.14$ , and empathy for animals no longer predicting pigs' competence,  $p = 0.06$ ,  $B = .05$ ,  $SE = 0.3$ . As main conclusions did not change, we report the original regressions here, which did not control for diet.

6. When excluding outliers and leverage values, pigs' similarity statistically significantly predicted dogs' competence,  $F(1, 219) = 4.33$ ,  $p = 0.04$ , partial  $\eta^2 = 0.02$ ,  $B = -0.35$ ,  $SE = 0.17$  (small-sized). Dogs' profit status,  $F(1, 219) = 2.96$ ,  $p = 0.09$ , partial  $\eta^2 = 0.01$ ,  $B = -0.19$ ,  $SE = 0.11$ , and pigs' familiarity,  $F(1, 219) = 1.6$ ,  $p = 0.21$ , partial  $\eta^2 = 0.01$ ,  $B = -0.17$ ,  $SE = 0.13$ , no longer statistically significantly predicted dogs' warmth.
7. However, these possible consequences of positive public perceptions of pigs should be explicitly tested.

## References

- Archer, J., & Monton, S. (2011). Preferences for infant facial features in pet dogs and cats. *Ethology*, *117*(3), 217–226. <https://doi.org/10.1111/j.1439-0310.2010.01863.x>
- Auger, B., & Amiot, C. E. (2015). Can pets facilitate identification with other animals? Testing the pets as ambassador hypothesis. Poster presented at the 75th Annual Convention of the Canadian Psychological Association, Ottawa, ON.
- Auger, B., & Amiot, C. E. (2016). Are all animals equal? Testing how contact with different animal types is associated with identification with animals. Poster presented at the 17th Annual Convention of the Society for Personality and Social Psychology, San Diego, CA.
- Auger, B., & Amiot, C. E. (2019a). The impact of imagined contact in the realm of human-animal relations: Investigating a superordinate generalization effect involving both valued and devalued animals. *Journal of Experimental Social Psychology*, *85*, 103872. <https://doi.org/10.1016/j.jesp.2019.103872>
- Auger, B., & Amiot, C. E. (2019b). Testing the roles of intergroup anxiety and inclusion of animals in the self as mechanisms that underpin the “pets as ambassadors” effect. *Anthrozoös*, *32*(1), 5–21. <https://doi.org/10.1080/08927936.2019.1550277>
- Auger, B., Amiot, C. E., & Bastian, B. (2015). Extending the pets as ambassadors hypothesis. Poster presented at the International Society of Anthrozoology (ISAZ) Annual Conference, New York, NY.
- Bandura, A. (1999). Moral disengagement in the perpetration of inhumanities. *Personality and Social Psychology Review*, *3*(3), 193–209. [https://doi.org/10.1207/s15327957pspr0303\\_3](https://doi.org/10.1207/s15327957pspr0303_3)
- Bastian, B., Loughnan, S., Haslam, N., & Radke, H. R. (2012). Don't mind meat? The denial of mind to animals used for human consumption. *Personality and Social Psychology Bulletin*, *38*(2), 247–256. <https://doi.org/10.1177/0146167211424291>
- Batt, S. (2009). Human attitudes towards animals in relation to species similarity to humans: A multivariate approach. *Bioscience Horizons*, *2*(2), 180–190. <https://doi.org/10.1093/biohorizons/hzp021>
- Bedford, E. (2021, May 5). Leading pets ranked by household ownership in the United Kingdom (UK) in 2020/21. *Statista*. Retrieved from <https://www.statista.com/statistics/308218/leading-ten-pets-ranked-by-household-ownership-in-the-united-kingdom-uk/>
- Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society: Series B (Methodological)*, *57*(1), 289–300. <https://doi.org/10.1111/j.2517-6161.1995.tb02031.x>
- Berglund, J. (2014). Princely companion or object of offense? The dog's ambiguous status in Islam. *Society & Animals*, *22*(6), 545–559. <https://doi.org/10.1163/15685306-12341357>
- Berkowitz, B. (2019). Animal studies and ancient Judaism. *Currents in Biblical Research*, *18*(1), 80–111.
- Bilewicz, M., Imhoff, R., & Drogosz, M. (2011). The humanity of what we eat: Conceptions of human uniqueness among vegetarians and omnivores. *European Journal of Social Psychology*, *41*(2), 201–209. <https://doi.org/10.1002/ejsp.766>
- Bishop, P. A., & Herron, R. L. (2015). Use and misuse of the Likert item responses and other ordinal measures. *International Journal of Exercise Science*, *8*(3), 297.
- Blanca, M. J., Alarcón, R., Arnau, J., Bono, R., & Bendayan, R. (2017). Non-normal data: Is ANOVA still a valid option? *Psicothema*, *29*(4), 552–557. <https://doi.org/10.7334/psicothema2016.383>
- Bornstein, R. F., & D'agostino, P. R. (1992). Stimulus recognition and the mere exposure effect. *Journal of Personality and Social Psychology*, *63*(4), 545.
- Bornstein, R. F., & D'agostino, P. R. (1994). The attribution and discounting of perceptual fluency: Preliminary

- tests of a perceptual fluency/attributional model of the mere exposure effect. *Social Cognition*, 12(2), 103–128. <https://doi.org/10.1521/soco.1994.12.2.103>
- Bratanova, B., Loughnan, S., & Bastian, B. (2011). The effect of categorization as food on the perceived moral standing of animals. *Appetite*, 57(1), 193–196. <https://doi.org/10.1016/j.appet.2011.04.020>
- Camilleri, L., Gill, P. R., & Jago, A. (2020). The role of moral disengagement and animal empathy in the meat paradox. *Personality and Individual Differences*, 164, 110103. <https://doi.org/10.1016/j.paid.2020.110103>
- Caviola, L., & Capraro, V. (2020). Liking but devaluing animals: Emotional and deliberative paths to speciesism. *Social Psychological and Personality Science*, 11(8), 1080–1088. <https://doi.org/10.1177/1948550619893959>
- Cembalo, L., Caracciolo, F., Lombardi, A., Del Giudice, T., Grunert, K. G., & Cicia, G. (2016). Determinants of individual attitudes toward animal welfare-friendly food products. *Journal of Agricultural and Environmental Ethics*, 29(2), 237–254. <https://doi.org/10.1007/s10806-015-9598-z>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Erlbaum.
- Cortes, B. P., Demoulin, S., Rodriguez, R. T., Rodriguez, A. P., & Leyens, J. P. (2005). Infrahumanization or familiarity? Attribution of uniquely human emotions to the self, the ingroup, and the outgroup. *Personality and Social Psychology Bulletin*, 31(2), 243–253. <https://doi.org/10.1177/0146167204271421>
- Costello, K. (2008). “Re-humanization”: The role of human-animal similarity in predicting prejudice towards immigrants and non-human animals. [Master of Arts thesis] Brock University, St. Catharines, Ontario.
- Cuddy, A. J., Fiske, S. T., & Glick, P. (2007). The BIAS map: Behaviors from intergroup affect and stereotypes. *Journal of Personality and Social Psychology*, 92(4), 631. <https://doi.org/10.1037/0022-3514.92.4.631>
- Danyluck, C., & Page-Gould, E. (2018). Intergroup dissimilarity predicts physiological synchrony and affiliation in intergroup interaction. *Journal of Experimental Social Psychology*, 74, 111–120. <https://doi.org/10.1016/j.jesp.2017.08.001>
- Davis, M. H. (1980). A multidimensional approach to individual differences in empathy. *JSAAS Catalog of Selected Documents in Psychology*, 10, 85.
- Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44(1), 113. <https://doi.org/10.1037/0022-3514.44.1.113>
- Deligianis, C., Stanton, C. J., McGarty, C., & Stevens, C. J. (2017). The impact of intergroup bias on trust and approach behaviour towards a humanoid robot. *Journal of Human-Robot Interaction*, 6(3), 4–20. <https://dl.acm.org/doi/abs/10.5898/JHRI.6.3.Deligianis>
- Department for Environment Food and Rural Affairs & Animal and Plant Health Agency (2014, December 31). Keeping a pet pig or “micropig.” *UK Government*. Retrieved from <https://www.gov.uk/guidance/keeping-a-pet-pig-or-micropig#register-as-pig-keeper>
- Department for Environment Food and Rural Affairs (2022, July 14). Monthly UK statistics on cattle, sheep and pig slaughter and meat production—statistics notice (data to June 2022). *DEFRA*. Retrieved from <https://www.gov.uk/government/statistics/cattle-sheep-and-pig-slaughter/monthly-uk-statistics-on-cattle-sheep-and-pig-slaughter-and-meat-production-statistics-notice-data-to-april-2022>
- Diamantopoulos, A., Florack, A., Halkias, G., & Palcu, J. (2017). Explicit versus implicit country stereotypes as predictors of product preferences: Insights from the stereotype content model. *Journal of International Business Studies*, 48(8), 1023–1036. <https://doi.org/10.1057/s41267-017-0085-9>
- Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.
- Fiske, S. T. (1998). Stereotyping, prejudice, and discrimination. *The handbook of social psychology*, 2(4), 357–411.
- Fiske, S. T., Xu, J., Cuddy, A. C., & Glick, P. (1999). (Dis)respecting versus (dis)liking: Status and interdependence predict ambivalent stereotypes of competence and warmth. *Journal of Social Issues*, 55(3), 473–489. <https://doi.org/10.1111/0022-4537.00128>
- Flores, A. R., Haider-Markel, D. P., Lewis, D. C., Miller, P. R., Tadlock, B. L., & Taylor, J. K. (2018). Challenged expectations: Mere exposure effects on attitudes about transgender people and rights. *Political Psychology*, 39(1), 197–216. <https://doi.org/10.1111/pops.12402>
- Glick, P., Fiske, S. T., Mladinic, A., Saiz, J. L., Abrams, D., Masser, B., Adetoun, B., Osagie, J. E., Akande, A., Alao, A., Annetje, B., Willemsen, T. M., Chipeta, K., Dardenne, B., Dijksterhuis, A., Wigboldus, D., Eckes, T., Six-Materna, I., Expósito, F., . . . López, W. L. (2000). Beyond prejudice as simple antipathy: Hostile and benevolent sexism across cultures. *Journal*

- of *Personality and Social Psychology*, 79(5), 763. <https://doi.org/10.1037/0022-3514.79.5.763>
- Gradidge, S., Harvey, A. J., McDermott, D. T., & Zawisza, M. (in press). Humankind's best friend vs. humankind's best food: Perceptions of identifiable dog vs. pig victims. *Human-Animal Interaction Bulletin*, 12(1), 15–27. Currently available at: <https://www.human-animal-interaction.org/haib/download-info/humankinds-best-friend-vs-humankinds-best-food-perceptions-of-identifiable-dog-vs-pig-victims/>
- Gradidge, S., & Zawisza, M. (2019). Why factual appeals about the abilities of sheep may fail. *Animal Sentience*, 25(42).
- Gradidge, S., & Zawisza, M. (2021). Different types of speciesism. *The Psychologist*. Available at: <https://thepsychologist.bps.org.uk/volume-34/february-2021/different-kind-speciesism>
- Gradidge, S., Zawisza, M., Harvey, A. J., & McDermott, D. T. (2021). A structured literature review of the meat paradox. *Social Psychological Bulletin*, 16(3), 1–26. <https://doi.org/10.32872/spb.5953>
- Gray, P. B., & Young, S. M. (2011). Human–pet dynamics in cross-cultural perspective. *Anthrozoös*, 24(1), 17–30. <https://doi.org/10.2752/175303711X12923300467285>
- Harmon-Jones, E., & Allen, J. J. (2001). The role of affect in the mere exposure effect: Evidence from psychophysiological and individual differences approaches. *Personality and Social Psychology Bulletin*, 27(7), 889–898. <https://doi.org/10.1177/0146167201277011>
- Hazel, S. J., Signal, T. D., & Taylor, N. (2011). Can teaching veterinary and animal-science students about animal welfare affect their attitude toward animals and human-related empathy? *Journal of Veterinary Medical Education*, 38(1), 74–83. <https://doi.org/10.3138/jvme.38.1.74>
- Herzog, H. (2014). Biology, culture, and the origins of pet-keeping. *Animal Behavior and Cognition*, 1(3), 296–308. <https://doi.org/10.12966/abc.08.06.2014>
- Hills, A. M. (1995). Empathy and belief in the mental experience of animals. *Anthrozoös*, 8(3), 132–142. <https://doi.org/10.2752/089279395787156347>
- IBM (2020, April 16). Multivariate linear regression in SPSS. Available at: <https://www.ibm.com/support/pages/multivariate-linear-regression-spss>
- Jain, K., & Srinivasan, N. (1990). An empirical assessment of multiple operationalizations of involvement. *ACR North American Advances*.
- Joy, M. (2011). *Why we love dogs, eat pigs and wear cows: An introduction to carnism*. Conari.
- Kaminski, J., Hynds, J., Morris, P., & Waller, B. M. (2017). Human attention affects facial expressions in domestic dogs. *Scientific Reports*, 7(1), 1–7. <https://doi.org/10.1038/s41598-017-12781-x>
- Kaminski, J., Waller, B. M., Diogo, R., Hartstone-Rose, A., & Burrows, A. M. (2019). Evolution of facial muscle anatomy in dogs. *Proceedings of the National Academy of Sciences*, 116(29), 14677–14681. <https://doi.org/10.1073/pnas.1820653116>
- Kendall, H. A., Lobao, L. M., & Sharp, J. S. (2006). Public concern with animal well-being: Place, social structural location, and individual experience. *Rural Sociology*, 71(3), 399–428. <https://doi.org/10.1526/003601106778070617>
- Kim, H. M. (2006). The effect of salience on mental accounting: How integration versus segregation of payment influences purchase decisions. *Journal of Behavioral Decision Making*, 19(4), 381–391. <https://doi.org/10.1002/bdm.534>
- Kim, H. Y. (2013). Statistical notes for clinical researchers: Assessing normal distribution (2) using skewness and kurtosis. *Restorative Dentistry & Endodontics*, 38(1), 52. <https://doi.org/10.5395/rde.2013.38.1.52>
- Kozachenko, H. H., & Piazza, J. (2021). How children and adults value different animal lives. *Journal of Experimental Child Psychology*, 210, 105204. <https://doi.org/10.1016/j.jecp.2021.105204>
- Krings, V. C., Dhont, K., & Salmen, A. (2021). The moral divide between high- and low-status animals: The role of human supremacy beliefs. *Anthrozoös*, 34(6), 787–802. <https://doi.org/10.1080/08927936.2021.1926712>
- Kunst, J. R., & Hohle, S. M. (2016). Meat eaters by dissociation: How we present, prepare and talk about meat increases willingness to eat meat by reducing empathy and disgust. *Appetite*, 105, 758–774. <https://doi.org/10.1016/j.appet.2016.07.009>
- Lea, S. E., & Osthau, B. (2018). In what sense are dogs special? Canine cognition in comparative context. *Learning & Behavior*, 46(4), 335–363. <https://doi.org/10.3758/s13420-018-0349-7>
- Loughnan, S., Haslam, N., & Bastian, B. (2010). The role of meat consumption in the denial of moral status and mind to meat animals. *Appetite*, 55(1), 156–159. <https://doi.org/10.1016/j.appet.2010.05.043>

- Luna, D., & Kim, H. M. C. (2009). How much was your shopping basket? Working memory processes in total basket price estimation. *Journal of Consumer Psychology, 19*(3), 346–355. <https://doi.org/10.1016/j.jcps.2009.03.003>
- Macdiarmid, J. I., Douglas, F., & Campbell, J. (2016). Eating like there's no tomorrow: Public awareness of the environmental impact of food and reluctance to eat less meat as part of a sustainable diet. *Appetite, 96*, 487–493. <https://doi.org/10.1016/j.appet.2015.10.011>
- Marino, L., & Colvin, C. M. (2015). Thinking pigs: A comparative review of cognition, emotion, and personality in *Sus domesticus*. *International Journal of Comparative Psychology, 28*(1). <https://doi.org/10.46867/ijcp.2015.28.00.04>
- McDonald, M., Porat, R., Yarkoney, A., Reifen Tagar, M., Kimel, S., Saguy, T., & Halperin, E. (2015). Intergroup emotional similarity reduces dehumanization and promotes conciliatory attitudes in prolonged conflict. *Group Processes & Intergroup Relations, 20*(1), 125–136. <https://doi.org/10.1177/1368430215595107>
- Miller, A. K., Amacker, A. M., & King, A. R. (2011). Sexual victimization history and perceived similarity to a sexual assault victim: A path model of perceiver variables predicting victim culpability attributions. *Sex Roles, 64*(5–6), 372–381. <https://doi.org/10.1007/s11199-010-9910-3>
- Monteiro, C. A., Pfeiler, T. M., Patterson, M. D., & Milburn, M. A. (2017). The carnism inventory: Measuring the ideology of eating animals. *Appetite, 113*, 51–62. <https://doi.org/10.1016/j.appet.2017.02.011>
- Montoya, R. M., Horton, R. S., & Kirchner, J. (2008). Is actual similarity necessary for attraction? A meta-analysis of actual and perceived similarity. *Journal of Social and Personal Relationships, 25*(6), 889–922. <https://doi.org/10.1177/0265407508096700>
- Pérez Fraga, P., Gerencsér, L., Lovas, M., Újváry, D., & Andics, A. (2021). Who turns to the human? Companion pigs' and dogs' behaviour in the unsolvable task paradigm. *Animal Cognition, 24*(1), 33–40. <https://doi.org/10.1007/s10071-020-01410-2>
- Pettier, J. B. (2020). Saving China's dogs: Social transformation and moral conflicts in Chinese society. *Critical Asian Studies, 1*–18. <https://doi.org/10.1080/14672715.2020.1830817>
- Pettigrew, T. F. (1998). Intergroup contact theory. *Annual Review of Psychology, 49*(1), 65–85. <https://doi.org/10.1146/annurevpsych.49.1.65>
- Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology, 90*(5), 751. <https://doi.org/10.1037/0022-3514.90.5.751>
- Pettigrew, T. F., & Tropp, L. R. (2008). How does intergroup contact reduce prejudice? Meta-analytic tests of three mediators. *European Journal of Social Psychology, 38*(6), 922–934. <https://doi.org/10.1002/ejsp.504>
- Piazza, J., & Loughnan, S. (2016). When meat gets personal, animals' minds matter less: Motivated use of intelligence information in judgments of moral standing. *Social Psychological and Personality Science, 7*(8), 867–874. <https://doi.org/10.1177/1948550616660159>
- Piazza, J., Ruby, M. B., Loughnan, S., Luong, M., Kulik, J., Watkins, H. M., & Seigerman, M. (2015). Rationalizing meat consumption. The 4Ns. *Appetite, 91*, 114–128. <https://doi.org/10.1016/j.appet.2015.04.011>
- Ponterotto, J. G., & Ruckdeschel, D. E. (2007). An overview of coefficient alpha and a reliability matrix for estimating adequacy of internal consistency coefficients with psychological research measures. *Perceptual and Motor Skills, 105*(3), 997–1014. <https://doi.org/10.2466/pms.105.3.997-1014>
- Powell, G. M. (2010). *The role of individual differences and involvement on attitudes toward animal welfare* (Doctoral dissertation, Kansas State University).
- Prguda, E., & Neumann, D. L. (2014). Inter-human and animal-directed empathy: A test for evolutionary biases in empathetic responding. *Behavioural Processes, 108*, 80–86. <https://doi.org/10.1016/j.beproc.2014.09.012>
- Reis, H. T., Maniaci, M. R., Caprariello, P. A., Eastwick, P. W., & Finkel, E. J. (2011). Familiarity does indeed promote attraction in live interaction. *Journal of Personality and Social Psychology, 101*(3), 557. <https://doi.org/10.1037/a0022885>
- Richardson, J. T. (2011). Eta squared and partial eta squared as measures of effect size in educational research. *Educational Research Review, 6*(2), 135–147. <https://doi.org/10.1016/j.edurev.2010.12.001>
- Rodriguez, K. E., Herzog, H., & Gee, N. R. (2021). Variability in human-animal interaction research. *Frontiers in Veterinary Science, 7*, 1207. <https://doi.org/10.3389/fvets.2020.619600>
- Rodríguez-Pérez, A., Delgado-Rodríguez, N., Betancor-Rodríguez, V., Leyens, J. P., & Vaes, J. (2011). Infrahumanization of outgroups throughout the world. The role of similarity, intergroup friendship, knowledge of the outgroup, and status. *Anales de Psicología, 27*(3), 679–687.

- Rothgerber, H. (2019). “But I don’t eat that much meat”: Situational underreporting of meat consumption by women. *Society & Animals*, 27(2), 150–173. <https://doi.org/10.1163/15685306-12341468>
- Rothgerber, H., & Mican, F. (2014). Childhood pet ownership, attachment to pets, and subsequent meat avoidance. The mediating role of empathy toward animals. *Appetite*, 79, 11–17. <https://doi.org/10.1016/j.appet.2014.03.032>
- Serpell, J. A. (2004). Factors influencing human attitudes to animals and their welfare. *Animal Welfare*, 13(1), 145–151.
- Serpell, J. A., & Paul, E. (1994). Pets and the development of positive attitudes to animals. In A. Manning & J. Serpell (Eds.), *Animals and human society: Changing perspectives* (pp. 127–144). Routledge.
- Sevillano, V., & Fiske, S. T. (2016). Warmth and competence in animals. *Journal of Applied Social Psychology*, 46(5), 276–293. <https://doi.org/10.1111/jasp.12361>
- Signal, T., Taylor, N., & Maclean, A. S. (2018). Pampered or pariah: Does animal type influence the interaction between animal attitude and empathy? *Psychology, Crime & Law*, 24(5), 527–537. <https://doi.org/10.1080/1068316X.2017.1399394>
- Singer, P. (1995) *Animal liberation* (2nd ed.). Pimlico.
- Springmann, M., Clark, M., Mason-D’Croz, D., Wiebe, K., Bodirsky, B. L., Lassaletta, L., de Vries, W., Vermeulen, S. J., Herrero, M., Carlson, K. M., Jonell, M., Troell, M., DeClerck, F., Gordon, L. J., Zurayk, R., Scarborough, P., Rayner, M., Loken, B., Fanzo, J., . . . Willett, W. (2018). Options for keeping the food system within environmental limits. *Nature*, 562(7728), 519–525. <https://doi.org/10.1038/s41586-018-0594-0>
- Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33–47). Brooks/Cole.
- Tausch, N., & Hewstone, M. (2010). Intergroup contact and prejudice. *The Sage handbook of prejudice, stereotyping, and discrimination* (pp. 544–560). Sage Publications.
- Taylor, N., & Signal, T. D. (2009). Pet, pest, profit: Isolating differences in attitudes towards the treatment of animals. *Anthrozoös*, 22(2), 129–135. <https://doi.org/10.2752/175303709X434158>
- Topolski, R., Weaver, J. N., Martin, Z., & McCoy, J. (2013). Choosing between the emotional dog and the rational pal: A moral dilemma with a tail. *Anthrozoös*, 26(2), 253–263. <https://doi.org/10.2752/175303713X13636846944321>
- Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. (1987). *Rediscovering the social group: A self-categorization theory*. Basil Blackwell.
- Wang, G. D., Zhai, W., Yang, H. C., Fan, R. X., Cao, X., Zhong, L., Wang, L., Liu, F., Wu, H., Cheng, L. G., Poyarkov, A. D., Poyarkov, N. A., Tang, S. S., Zhao, W. M., Gao, Y., Lv, X. M., Irwin, D. M., Savolainen, P., Wu, C. I., & Zhang, Y. P. (2013). The genomics of selection in dogs and the parallel evolution between dogs and humans. *Nature Communications*, 4(1), 1–9. <https://doi.org/10.1038/ncomms2814>
- West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation models with nonnormal variables: Problems and remedies. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues and applications*. SAGE Publications.
- Westbury, H. R., & Neumann, D. L. (2008). Empathy-related responses to moving film stimuli depicting human and non-human animal targets in negative circumstances. *Biological Psychology*, 78(1), 66–74. <https://doi.org/10.1016/j.biopsycho.2007.12.009>
- Wunsch, N. G. (2021, Oct 12). Veganism and vegetarianism in the United Kingdom—Statistics & facts. *Statista*. Available at: <https://www.statista.com/topics/7297/veganism-in-the-united-kingdom/#dossierKeyfigures>
- YouGov (2014). YouGov survey results. *YouGov*. Available at: [http://cdn.yougov.com/cumulus\\_uploads/document/n9y67k53la/YG-Archive-140319-Fears.pdf](http://cdn.yougov.com/cumulus_uploads/document/n9y67k53la/YG-Archive-140319-Fears.pdf)
- Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology*, 9(2p2), 1. <https://doi.org/10.1037/h0025848>
- Zawisza, M. J. (2016). Applying universal dimensions of social perception to consumer context: An extension of the SCM/BIAF models with the relevance principle. In *Routledge International Handbook of Consumer Psychology* (pp. 234–249). Routledge.
- Zawisza, M., Luyt, R., Zawadzka, A. M., & Buczny, J. (2018). Cross-cultural sexism and the effectiveness of gender (non) traditional advertising: A comparison of purchase intentions in Poland, South Africa, and the United Kingdom. *Sex Roles*, 79(11), 738–751. <https://doi.org/10.1007/s11199-018-0906-8>
- Zickfeld, J. H., Kunst, J. R., & Hohle, S. M. (2018). Too sweet to eat: Exploring the effects of cuteness on meat consumption. *Appetite*, 120, 181–195. <https://doi.org/10.1016/j.appet.2017.08.038>