ANGLIA RUSKIN UNIVERSITY

FACULTY OF SCIENCE AND ENGINEERING

THE EFFECT OF SPECIES ON PERCEPTIONS OF ANIMALS: PREDICTORS AND CAUSES OF PET SPECIESISM

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A thesis in partial fulfilment of the requirements of Anglia Ruskin University for the degree of Doctor of Philosophy

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ABSTRACT

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What was Investigated and Why

Dogs and pigs share multiple traits, yet dogs are typically companions whilst pigs are food, a phenomenon termed pet speciesism. Pet speciesism can harm animal welfare due to meat consumption and associated climate change. Whilst previous research evidences pet speciesism, research has yet to identify why pet speciesism occurs. This thesis therefore explores possible causes drawn from previous literature, so future interventions can reduce or prevent pet speciesism: behavioural self-relevance, subjective self-relevance, familiarity, similarity to humans, pet status, and profit status.

How the Topic was Investigated

Pet speciesism is operationalised here across six psychological dimensions from the Stereotype Content Model (SCM) and Behaviours from Intergroup Affect and Stereotypes (BIAS) map: Warmth, competence, active help, active harm, passive help, and passive harm. I explored the above possible causes through six studies: Firstly, a regression identifying which variables were significantly associated with pet speciesism, followed by five experiments manipulating potential causes of pet speciesism.

What was Found

Behavioural self-relevance, subjective self-relevance, familiarity, similarity, and pet status were significant regressors. The causal experiments found that: Neither behavioural nor subjective self-relevance caused pet speciesism. Conversely, similarity significantly caused pet speciesism in most SCM/BIAS map dimensions. Familiarity could not be effectively manipulated. Finally, pet status may significantly cause pet speciesism, but only in limited SCM/BIAS map dimensions.

What Conclusions were Drawn

This thesis concludes that similarity causes pet speciesism in most SCM/BIAS map dimensions, whereas pet status may cause pet speciesism only in limited SCM/BIAS map dimensions. The thesis also highlights unexpected null effects of behavioural and subjective self-relevance and failed familiarity manipulations. Overall, this thesis uniquely tests extrinsic causes of pet speciesism, with extensive theoretical (demonstrating limitations of previous literature) and practical (informing interventions) implications. The research may inform interventions which decrease pet speciesism and reduce meat consumption.

Keywords: pet speciesism, Stereotype Content Model, BIAS map, dog, pig

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Notation

BIAS map = the Behaviours from Intergroup Affect and Stereotypes map

DV = dependent variable

IV = independent variable

PAFA = principal axis factor analysis

RQ = research question

SCM = the Stereotype Content Model

Chronology of Events

Studies within this thesis were conducted in the following order:

- Study 1: October and November 2019
- Study 2: April and May 2020
- Study 4: January and February 2021
- Study 3: November 2021
- Study 6: March 2021 and November 2021
- Study 5: November and December 2021

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Third Party Copyright Declaration

The Effect of Species on Perceptions of Animals: Predictors and Causes of Pet Speciesism

Sarah May Gradidge

Chapter 1. Introduction

1.1. Dog vs. Pig Pet Speciesism

Differences in how dogs and pigs are treated within countries such as the United Kingdom are stark: Approximately 34% of households in the United Kingdom have a pet dog (Bedford, 2022) and dogs are commonly called 'man's best friend', yet hundreds of thousands of pigs are slaughtered each month for meat in the United Kingdom (e.g., 941,000 in June 2022 alone; Department for Environment, Food & Rural Affairs [DEFRA], 2022). These stark differences in how dogs and pigs are treated occur despite their multiple shared attributes: For example, pigs show comparable skill to dogs at cognitive abilities like spatial navigation and memory (Arts et al., 2009; Smith et al., 2021), learning (Broom et al., 2009; Fukuzawa & Igarishi, 2017), and recognition of individual conspecifics (McLeman et al., 2005, 2008; Racca et al., 2010). Both animals reside in socially intricate groups (Marino & Colvin, 2015), and engage in social play (Horback, 2014; Ward et al., 2008). Dogs and pigs also demonstrate similar emotionality, especially within a social context (Csoltova & Mehinagic, 2020; Reimert et al., 2013, 2015). Additionally, dogs and pigs share similar appearances, with both animals being quadruped mammals of relatively similar size. The vast differences in treatment of dogs and pigs within countries such as the United Kingdom, despite dogs' and pigs' multiple shared characteristics, may be arising from *prejudice:* Unjustified and unfair bias against, or in favour of, certain groups. Prejudice against or towards animals due to their taxonomic classification is termed *speciesism* (Singer, 1990), which takes two main forms: *anthropocentric speciesism* (prejudice against all animals in favour of humans) and *pet speciesism* (Caviola & Capraro, 2020), with the latter being the focus of this thesis.

Pet speciesism constitutes any form of prejudice in favour of 'pet' animals like dogs or cats, and against 'non-pet' animals like pigs or cows. Pet speciesism can therefore be measured by comparing any pet animal to any non-pet animal (e.g., cat vs. pig, dog vs. cow). However, dogs and pigs represent a natural ‘matched pair’ to investigate pet speciesism, as these two species share multiple similarities in cognition, appearance, behaviour, emotionality, and sociality as seen above, yet receive highly differential treatment within countries like the United Kingdom. Additionally, dog vs. pig pet speciesism has already been evidenced across multiple psychological domains, including liking for dogs over pigs (Caviola & Capraro, 2020), viewing dogs as being more capable of feeling emotions than pigs (Bilewicz et al., 2011), feeling greater empathy towards and willingness to help dog (vs. pig) victims (Gradidge et al., 2021b), and expressing less *victim derogation* (negative perceptions of a victim) and less *second-hand forgiveness* (forgiveness for the perpetrator who harmed a victim) towards dog (vs. pig) victims (Gradidge et al., 2021b). I therefore focus on dog vs. pig pet speciesism (hereon pet speciesism) throughout this thesis.

Pet speciesism holds extremely negative consequences for pigs, including loss of their lives to deliberate human activities such as meat production, and severe negative welfare implications within meat production, such as farrowing crates (McCulloch, 2022) and tail docking (De Briyne et al., 2018). Additionally, meat consumption (including from pigs) holds wider global negative consequences by significantly contributing to climate change (González et al., 2020), such as through greenhouse gas emissions (Godfray et al., 2018). Climate change in turn has disastrous direct and indirect consequences for human welfare. Directly, climate change is leading and will lead to increasingly frequent and intense natural disasters like extreme flooding, storms, and heatwaves (Intergovernmental Panel on Climate Change [IPCC], 2021; Philip et al., 2021). Climate change has been projected to cause up to 83 million deaths at 4.1°C of global warming above pre-industrial levels or nine million deaths at 2.4°C by 2100 (Bressler, 2021), and climate change will inevitably create ‘climate refugees’ (i.e., people displaced from their homes due to natural disasters; Berchin et al., 2017; Islam & Khan, 2018). Indirectly, climate change will harm the welfare of wild animals, such as through biodiversity loss and ecosystem collapse (Canadell & Jackson, 2021; Machovina et al., 2015), and by compounding negative consequences of habitat loss (Mantyka-Pringle et al., 2012). Negative effects of climate change on wild animals (e.g., loss of biodiversity) in turn harms humans, such as by increasing the risk of zoonotic diseases to humans (Keesing & Ostfeld, 2021), and thereby causing human deaths and increasing the risk of future pandemics. Reducing meat consumption is thus crucial for meeting global climate targets (Springmann et al., 2018).

One tool for reducing (pig) meat consumption, and thereby protecting human, pig, and wild animal welfare, is to improve perceptions of pigs by targeting causes of pet speciesism. That is, by identifying exactly why pet speciesism occurs, interventions can be developed to remove these causes, and thus reduce or prevent pet speciesism. Alongside possibly reducing (pig) meat consumption, this approach may have broader positive effects for pigs, such as protections within scientific research, especially amid growing interests in organ transplantation from pigs (Koplin & Wilkinson, 2019; Shah & Han, 2022), policymakers implementing policies to better protect pig welfare (e.g., eliminating farrowing crates), and the public advocating for pig welfare (Garner, 1995, 2008; Munro, 2005). However, previous research has not yet elucidated exactly why pet speciesism occurs, limiting the ability of interventions to reduce pet speciesism and thereby improve perceptions of pigs. Considering limited previous research, and the urgent and crucial need to reduce pet speciesism, this thesis thus tests possible causes of pet speciesism and is designed to inform future interventions to reduce or prevent pet speciesism. Before discussing possible causes of pet speciesism, I first discuss how this thesis operationalises pet speciesism.

1.2. Framework for Measuring Pet Speciesism

Pet speciesism is prejudice towards certain species of animals (‘pet’ animals like dogs) and against other species (‘non-pet’ animals like pigs; Caviola & Capraro, 2020). Pet speciesism can be measured across any psychological dimension, including liking (Caviola & Capraro, 2020), emotional attribution (Bilewicz et al., 2011), and empathy (Gradidge et al., 2021b). However, a robust and consistently used measure of pet speciesism has not yet been developed, which undermines investigations of pet speciesism. Social psychological research provides consistent and robust measurements of peoples’ perceptions of others through the *Stereotype Content Model* (SCM; Fiske, 1998; Fiske, et al., 1999). Importantly, this model applies to animals (Sevillano & Fiske, 2016a, 2016b, 2019), and thus represents an appropriate framework to measure pet speciesism. The SCM proposes peoples’ perceptions of others (human or non-human) consist of two dimensions: *warmth* (how much another being’s intent is perceived as being positive) and *competence* (how much another being is perceived as being capable of enacting intent; Fiske, 1998; Fiske et al., 1999). Applied to animals, warmth is a perceived tendency of an animal towards friendly or aggressive intent, whilst perceptions of competence can be informed by an animal’s friendly (e.g., wagging tail) or aggressive (e.g., biting) behaviours or capabilities (Sevillano & Fiske, 2016a, 2016b).

The SCM, as applied to humans, indicates stereotypes are formed from warmth and competence judgements, creating four stereotypes: *contemptuous* (low warmth, low competence; e.g., people in poverty), *envious* (low warmth, high competence; e.g., wealthy people), *paternalistic* (high warmth, low competence; e.g., elderly people), and *admired* (high warmth, high competence; e.g., *ingroup* members, whereby ingroups are groups to which a person belongs and/or feels identification with; Fiske et al., 2002). Similar stereotypes apply to animals: ‘*pests*’/*contemptible stereotype* (low warmth, low competence, e.g., rats), ‘*predators*’/*threatening-awe stereotype* (low warmth, high competence, e.g., tigers), ‘*prey*’/*subordination stereotype* (moderate warmth, low competence, e.g., pigs), and ‘*companions*’/*protective stereotype* (high warmth, high competence, e.g., dogs; Sevillano & Fiske, 2016b; Figure 1). Low warmth and/or competence of a being denotes prejudice against them, whilst high warmth and competence indicates prejudice in favour of them.

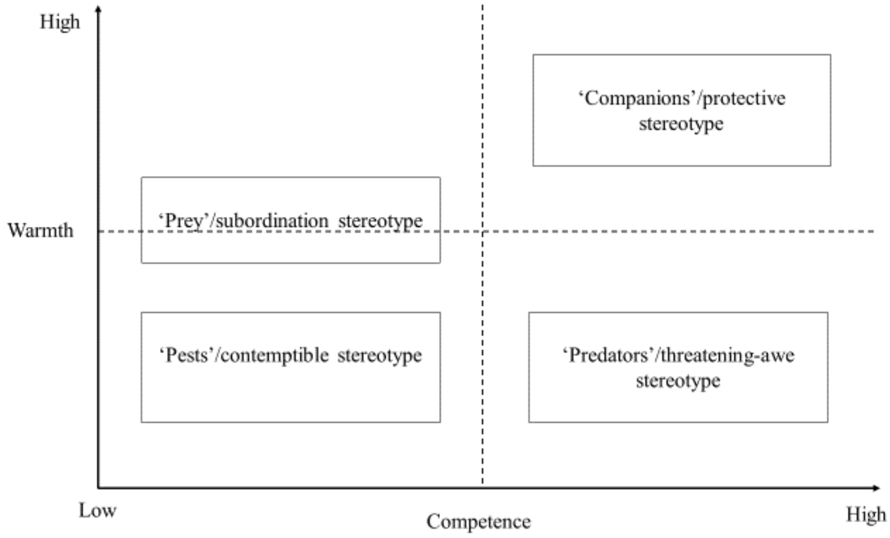

Figure 1. The SCM stereotypes of animals per Sevillano and Fiske (2019b).

The SCM represents an appropriate, robust and consistent measurement of pet speciesism for three reasons: a) the model applies to animals (Sevillano & Fiske, 2016b, 2019), b) established measures from the model have adequate reliability and validity (Diamantopoulos et al., 2017; Sevillano & Fiske, 2016b), and c) the model extends to behavioural intentions through the *Behaviours from Intergroup Affect and Stereotypes (BIAS) map* (Cuddy et al., 2007), whereby warmth and competence evaluations of a being inform active and passive behavioural intentions respectively towards that being. Specifically, ‘warm’ people or animals are typically subject to greater *active help* (intentional and effortful aid) and less *active harm* (intentional and effortful harm; Cuddy et al., 2007; Sevillano & Fiske, 2016b, 2019). Meanwhile, ‘competent’ people or animals are typically subject to greater *passive help* (aid which requires minimal effort) and less *passive harm* (exclusionary harmful behaviour which requires minimal effort; Cuddy et al., 2007; Sevillano & Fiske, 2016b, 2019).[1] Combined implementation of the SCM/BIAS map within this thesis thus enables pet speciesism gaps in perceptions of dogs vs. pigs (warmth, competence), and behavioural intentions towards dogs vs. pigs (active help, passive help, active harm, passive harm), to be explained.

Having established the psychological framework utilised to measure pet speciesism, I now consider possible causes of pet speciesism.

1.3. Causes of Pet Speciesism

Humans' perceptions of animals, including dogs and pigs, likely arise from two main sources: '*intrinsic*' factors referring to variables inherent to an animal (e.g., appearance, behaviour), and '*extrinsic*' factors referring to variables imposed onto an animal by humans (e.g., familiarity with an animal; Serpell, 2004). Research on intrinsic factors which inform people's positive perceptions of dogs is abundant. Dogs are viewed positively due to intrinsic factors such as their appearance (Archer & Monton, 2011; Kaminski et al., 2019), their evolved behaviour towards humans (e.g., responsiveness; Bray et al., 2021; Johnston et al., 2017; Pérez Fraga et al., 2021), and their innate sociability, predating to their wolf ancestors (Cordoni & Pelagi, 2019). Whilst dogs and pigs share positive intrinsic factors (e.g., Marino & Colvin, 2015), like their high sociability (Cooper et al., 2003; Podgórski et al., 2014), which should inform positive perceptions of both animals, dogs are superior to pigs in some

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[1] Warmth can also sometimes inform passive behavioural intentions (i.e., greater warmth increasing passive help and reducing passive harm; Cuddy et al., 2007; Sevillano & Fiske, 2019), whilst competence can sometimes also inform active behavioural intentions (i.e., greater competence increasing active help and reducing active harm; Sevillano & Fiske, 2019). These findings occur especially for ambivalent groups (e.g., animals which are deemed highly warm but low in competence or vice versa; Sevillano & Fiske, 2019). However, these findings are not always replicated (e.g., Sevillano & Fiske, 2016b).

intrinsic factors, such as their responsiveness to humans (Gerencsér et al., 2019; Pérez Fraga et al., 2021). Thus, intrinsic factors are likely contributing at least partly to pet speciesism.

Yet, only focussing on intrinsic factors raises two main issues. Firstly, intrinsic factors are inflexible: Changing intrinsic factors in interventions is either impossible or raises significant ethical issues. For example, intrinsic factors, like appearance and behaviour, can technically be amended through human-controlled selective breeding of animals, but this breeding raises ethical concerns (e.g., brachycephalic dog breeds; O'Neill et al., 2020; Packer et al., 2019) and requires generations of animals to implement the change. Additionally, selective breeding for intrinsic factors deemed positive by humans is not beneficial for improving perceptions of non-domesticated animals (e.g., animals outside the remit of human-controlled selective breeding) and may reinforce the superiority of certain intrinsic attributes over others. Conversely, extrinsic factors are more conducive to change in interventions as these factors are not inherent to species. For example, if pigs are viewed negatively because people are not as familiar with pigs as they are with dogs, then increasing familiarity by interacting with pigs would represent a feasible and ethical intervention to reduce pet speciesism.

Secondly, peoples' perceptions of other humans are frequently informed by social psychological (extrinsic) factors, like perceived similarity to the self and familiarity with the person (e.g., Pettigrew & Tropp, 2006; Rodríguez-Pérez et al., 2011). These social psychological cues also likely apply to perceptions of animals and to pet speciesism specifically. For instance, dogs are not universally deemed companion animals across cultures and history: Dogs have been and/or are currently consumed as meat within many cultures around the world (e.g., China and Hong Kong, Hurley, 2016, Li et al., 2017, Poon, 2014; some Native American groups, Roberts, 2017; South Korea, Oh & Jackson, 2011, Podberscek, 2009; Spain, Vallejo et al., 2017; the Yup'ik people of Alaska, McManus-Fry et al., 2018), and killing and consumption of dogs is commonplace within some contemporary societies (Gray & Young, 2011). Historically, dogs have been kept for functions like protection and hunting instead of companionship (Herzog, 2014), alongside being used as a source of meat, such as during the Bronze Age (Price et al., 2020), and Iron Age (Horard-Herbin et al., 2018). Pigs are also not universally deemed 'food' across cultures: For instance, pigs are kept as pets in some contemporary societies (Gray & Young, 2011), including the Aymara people from South America, Ekari people from Indonesia, Hokkien Taiwanese people, Trobriand Islanders from Papua New Guinea, and Tucano people from South America (P. Gray, personal communication, June 28, 2022).

There are also within-culture differences and deviations in perceptions of dogs and pigs. For example, despite dogs' exalted status as 'man's best friend', an estimated 14% of people within the United Kingdom are either a little (11%) or a lot (3%) afraid of dogs (YouGov, 2014). Abuse against dogs is still prevalent, with over 92,000 reports of abuse against dogs received by the RSPCA in 2021 (RSPCA, 2022). Additionally, despite pigs' widespread usage in meat production within countries like the United Kingdom and United States, keeping 'micro-pigs' as pets still arose as a trend within these countries (Curnutte, 2014).

Thus, despite intrinsic factors working in favour of dogs and against pigs, like dogs' greater responsiveness to humans (Pérez Fraga et al., 2021), perceptions of dogs and pigs are not fixed and can vary across cultures, history, and individuals. Therefore, dogs being deemed companion animals and pigs being deemed 'food' (pet speciesism) is not a default position informed solely by dogs' and pigs' intrinsic characteristics. Instead, where pet speciesism does occur, it is likely to arise also from extrinsic factors, such as social learning that dogs are 'pets' (*pet status*) and pigs are 'food' (*profit status*), learnt personal habits and investment in consuming pig meat *(behavioural self-relevance* and *subjective self-relevance*), and personal experiences with dogs and pigs (e.g., *familiarity* with each animal and how much each animal is deemed *similar* to humans). Indeed, anthropocentric speciesism (prejudice against all animals in favour of humans) is seemingly learnt during childhood or adolescence, as five-to-nine-year-old children exhibit far lower anthropocentric speciesism than adults (Wilks et al., 2021). Although such learning has not yet been evidenced for pet speciesism specifically, this research indicates people learn their perceptions of animals through culture, and thus suggests learnt extrinsic factors inform pet speciesism. Overall, incorporating extrinsic factors into explaining pet speciesism allows for a broader explanation of why pet speciesism is occurring, accounts for cultural, historical, and individual diversity in perceptions of dogs and pigs, and allows for the development of feasible interventions to reduce or prevent pet speciesism.

Despite the benefits of exploring extrinsic factors, these factors have not yet been applied to pet speciesism. Thus, for the first time, this thesis explores the following extrinsic factors which may cause pet speciesism, with a view to informing future research which develops interventions to reduce or prevent pet speciesism: *behavioural self-relevance* of pigs (whether or how much someone consumes pig meat), *subjective self-relevance* of pigs (whether or how much someone enjoys consuming pig meat), *familiarity* (quantity and/or quality of contact with an animal), *similarity to humans* (how much animals are viewed as possessing human-like characteristics), *pet status* (how much an animal is deemed a 'pet') and *profit status* (how much an animal is deemed 'profitable' for humans). These possible extrinsic causes have been selected from social psychological (familiarity, similarity) or speciesism (behavioural self-relevance, subjective self-relevance, pet status, profit status) literature bases, and have all previously been linked to perceptions of animals (self-relevance, Piazza & Loughnan, 2016; pet status and profit status, Signal et al., 2018; familiarity, Auger & Amiot, 2019b; similarity, Prguda & Neumann, 2014). Additionally, these variables capture a range of extrinsic factors arising from different sources, such as social learning (pet status, profit status), learnt personal habits (behavioural self-relevance, subjective self-relevance) and personal experiences (familiarity, similarity). Research has either not yet tested whether these extrinsic factors causally inform perceptions of animals and/or research has not yet tested whether these extrinsic factors cause pet speciesism specifically. I discuss these extrinsic factors individually and in more detail below.

1.3.1. Self-Relevance

The term '*self-relevance*' has traditionally been used to refer to whether or how much someone uses (e.g., consumes) an animal for personal benefit (e.g., for meat; Piazza & Loughnan, 2016). For instance, cows are self-relevant for people who consume meat from cows. Self-relevance has typically been theorised to cause negative perceptions of self-relevant animals, like pigs (see Gradidge et al., 2021a for further detail). Specifically, most people wish to avoid harming pigs and other animals yet using pigs and other 'food' animals for personal benefit (e.g., consuming them as meat) harms them by default. This conflict is theorised to cause feelings of discomfort, termed '*cognitive dissonance*' (hereon *dissonance*), which people are motivated to alleviate (Loughnan et al., 2014; Rothgerber, 2020). Thus, people typically choose either to stop consuming pigs and other animals and view the animals positively ('*moral engagement*'), or to continue consuming pigs and other animals and view the animals negatively ('*moral disengagement*'; Gradidge et al., 2021a; Loughnan et al., 2014). As most people continue to consume meat (e.g., 86-91% of the United Kingdom population; Johnson, 2022), many people morally disengage from pigs and other 'food' animals by viewing these animals negatively (Gradidge et al., 2021a). Therefore, (pig) meat consumers are motivated to view pigs negatively to alleviate their discomfort, termed '*motivated cognition*' (Piazza & Loughnan, 2016). Self-relevance as a possible cause of pet speciesism would thereby operate through a) pigs being self-relevant to most people, as pigs are regularly consumed as meat (e.g., DEFRA, 2022), and b) pigs' self-relevance causing meat consumers to view pigs as lacking warmth and competence, and to have more negative behavioural intentions towards them.

Previous research indicates self-relevance indeed contributes to negative perceptions of self-relevant animals. For instance, when participants consume dried beef (vs. dried nuts), they perceive cows as having lower *moral status* (how much an animal is deemed worthy of moral consideration) and feel less responsibility to have moral concern for animals (Loughnan et al., 2010). That is, making cows self-relevant (through consuming dried beef vs. not) causes cows to be viewed more negatively (through lower moral status and reduced moral concern for animals) as a way to reduce one's moral discomfort and justify one's consumption of cows.

Applied to pigs specifically, people typically ignore positive intelligence information about self-relevant animals (pigs) when forming their judgements of pigs' moral status, whilst not ignoring such intelligence information about non-self-relevant animals like fictional animals or tapirs (Piazza & Loughnan, 2016). Specifically, how intelligent (or not) an animal is presented as is important for informing the animal's perceived moral status, whereby more intelligent animals are deemed as having greater moral status, unless the animal is self-relevant. These findings indicate people are motivated not only to view self-relevant animals negatively, but also to disregard positive information about self-relevant animals.

However, research exploring causal effects of self-relevance on perceptions of animals is limited, and, when self-relevance has been causally manipulated (e.g., Loughnan et al., 2010), it has not yet been applied to pigs nor to the SCM/BIAS map specifically. Furthermore, previous self-relevance literature has solely explored investment in meat consumption through actual behaviour rather than investment in meat consumption through psychological attitudes towards meat (e.g., liking for meat). I thus differentiate here between traditional self-relevance (which I term '*behavioural self-relevance*'), describing behavioural investment in meat consumption (e.g., actual meat consumption), and a related but distinct possible form of self-relevance, which I term '*subjective self-relevance*', referring to psychological investment in meat consumption (e.g., liking for meat).

Regarding 'subjective self-relevance', previous research indicates liking meat is frequently associated with, and may therefore impact, perceptions of animals. For instance, meat consumption is often described as 'pleasurable' or 'nice' (Hyers, 2006; Macdiarmid et al., 2016; Piazza et al., 2015), and greater meat enjoyment is linked to greater denial of animals' ability to suffer (Monteiro et al., 2017). Whilst perceived 'niceness' of meat is typically employed as a strategy to justify meat consumption (Piazza et al., 2015), perceived 'niceness' may also enhance commitment to meat consumption, and thus necessitate stronger devaluing of self-relevant animals to alleviate stronger dissonance. Subjective self-relevance should thus work in an identical way to behavioural self-relevance due to motivated cognition: The greater psychological investment in meat (e.g., liking for meat) for a particular animal, the more negatively that animal should be viewed. Subjective self-relevance would therefore cause pet speciesism through a) pigs being subjectively self-relevant to most people, as most people enjoy consuming pig meat, and b) pigs' subjective self-relevance causing meat enjoyers to view pigs as lacking warmth and competence, and to have more negative behavioural intentions towards them. Behavioural and subjective self-relevance hypothetically share the same underlying motivational process, whereby investment in meat consumption motivates people to view meat animals negatively, yet behavioural and subjective self-relevance differ in their exact type of investment: Behavioural self-relevance is motivated by actual consumption of meat, whilst subjective self-relevance is motivated by enjoyment of meat. Extending upon previous literature, this thesis uniquely aims to test, firstly, whether behavioural and subjective self-relevance are associated with pet speciesism (Study 1) and, secondly, whether behavioural and subjective self-relevance cause pet speciesism (Studies 2-3).

1.3.2. Familiarity

Familiarity refers to the amount (quantity) or perceived value (quality) of contact with another being (Auger & Amiot, 2016). Familiarity is important for positively informing peoples' perceptions of fellow humans (Reis et al., 2011), including through actual (Pettigrew & Tropp, 2006) and imagined (Vezzali et al., 2012) intergroup contact, whereby interacting with (or imagining interacting with) members of human *outgroups* (groups to which a person does not belong and/or feel identification with) improves feeling towards them. Even familiarity (vs. unfamiliarity) of human faces alone increases their likeability (Harmon-Jones & Allen, 2001), and people view familiar (vs. unfamiliar) faces as being happier (Carr et al., 2017; Claypool et al., 2007). Additionally, familiarity (vs. unfamiliarity) of a face enables better recognition of emotional expression on that face (Li et al., 2019). Such findings indicate people are biased in favour of familiar others (e.g., Zebrowitz et al., 2007). People are also biased against unfamiliar others (Zebrowitz et al., 2007), and greater familiarity with outgroups can reduce prejudice against them, including transgender people (Flores et al., 2018), and people of different ethnicities to one's own (Zebrowitz et al., 2008).

Positive effects of familiarity have been explained by multiple theories, including the *mere exposure effect* (Zajonc, 1968) and *intergroup contact theory* (Pettigrew, 1998; see Swami, 2021, for alternative theories). The mere exposure effect suggests familiarity enhances liking due to repeated exposure to a stimulus. This repeated exposure is theorised to enable easier recognition of the stimulus ('*perceptual fluency*'), and this positive experience of 'perceptual fluency' is erroneously attributed to liking for the stimulus (Bornstein &

D’Agostino, 1992, 1994). Alternatively, intergroup contact theory suggests familiarity increases liking as (positive) intergroup contact provides the opportunity to learn that the outgroup is not threatening and thereby reduces intergroup anxiety (Pettigrew & Tropp, 2008). Alongside decreasing negative affect, intergroup contact can increase positive affect (Tausch & Hewstone, 2010), subsequently enhancing empathy towards the outgroup (Pettigrew & Tropp, 2008).

In line with these theories, positive effects of familiarity have been extended to animals. For example, *imagined intergroup contact* with dogs and cows (i.e., imagining interacting with these animals) increases inclusiveness of animals into the self and encourages positive behavioural intentions towards animals (Auger & Amiot, 2019b). Greater contact with animals also bolsters identification with them (Auger & Amiot, 2016), alongside enhancing inclusiveness of animals within the self and lowering animal-related intergroup anxiety, thus predicting more positive attitudes and behavioural intentions towards animals as a whole and towards animal subgroups (Auger & Amiot, 2019a). Greater familiarity with animals has also been linked to viewing animals as capable of experiencing a wider range of emotions, both for animals as a whole and for specific species (Morris et al., 2012). In addition, greater familiarity with an animal is associated with more positive perceptions of the animal (Possidónio et al., 2019). Whilst this previous research indicates positive relationships between familiarity and perceptions of animals, this research has not yet been applied to pet speciesism specifically nor to the SCM/BIAS map. In addition, causal effects of familiarity have rarely been investigated, and, where positive causal effects have been determined (Auger & Amiot, 2019b), effects of familiarity have been tested on perceptions of all animals or perceptions of animal subgroups (e.g., ‘farm’ animals), but not yet perceptions of specific species.

Due to the high prevalence of dogs kept as pets within households (Bedford, 2022), combined with positive effects of familiarity on perceptions of animals (Auger & Amiot, 2019b), a) dogs should be deemed more familiar than pigs, and b) dogs' greater familiarity should inform their greater warmth and competence and more positive behavioural intentions towards them. This thesis uniquely tests these hypotheses by exploring, firstly, if familiarity is associated with pet speciesism (Study 1) and, secondly, if familiarity causes pet speciesism (Study 4).

1.3.3. Similarity to Humans

Similarity to humans is how much animals are perceived as possessing human-like characteristics (Amiot et al., 2020). Perceived similarity typically informs more positive perceptions of other humans in an interpersonal context (although see Swami, 2021 for exceptions). For instance, people typically prefer others they perceive as similar (vs. dissimilar) to themselves (Montoya et al., 2008). People also typically attribute perceived similar (vs. less similar) others as being more capable of experiencing secondary emotions, such as pride, nostalgia, or compassion (Rodríguez-Pérez et al., 2011). As secondary emotions are deemed more 'human-like' than primary emotions such as anger, joy, or fear (Demoulin et al., 2004; Leyens et al., 2001), greater attribution of secondary emotions due to similarity thus increases others' perceived humanity (Gaunt et al., 2002; Leyens et al., 2001). As attribution of secondary emotions increases pro-social behavioural intentions (Vaes et al., 2002), people may theoretically act more pro-socially towards similar (vs. dissimilar) others due to similar others being deemed capable of experiencing secondary emotions. Conversely, dissimilarity decreases others' perceived humanity (*dehumanization*), by denying dissimilar others the capacity to experience 'human-like' secondary emotions (Leyens et al., 2001). Indeed, peoples' preferences against or towards others may be driven by similarity and dissimilarity, whereby dissimilarity leads people to exclude dissimilar others from one's social circle and similarity informs attraction within the remaining social circle (Byrne et al., 1986; see Swami, 2021).

As applied to animals, similarity improves perceptions of them: People consistently prefer (Batt, 2009; Kozachenko & Piazza, 2021) and empathise more with (Harrison & Hall, 2010; Miralles et al., 2019; Prguda & Neumann, 2014; Westbury & Neumann, 2008) animals which are more (vs. less) biologically and behaviourally similar to humans. Greater perceived similarity of an animal to humans is also linked to more positive perceptions of the animal (Possidónio et al., 2019). Additionally, emphasising similarities of animals to humans (vs. similarities of humans to animals) increases animals' perceived ability to feel sensations, which in turn increases moral inclusivity for animals (Bastian et al., 2012b). This greater moral inclusivity itself predicts lower speciesism and greater moral concern for the (animal) outgroup (Bastian et al., 2012b).

A detailed causal analysis found that describing animals as having (vs. lacking) mental characteristics, like emotions and cognitive capabilities, increased *mind attribution* towards animals (how much an animal is viewed as possessing a mind), with some characteristics influencing perceptions of animals more than others (e.g., spatial reasoning informing greater perceived capability for thinking; Leach et al., 2021). Whilst this research suggests highlighting mental capacities of animals, and thus making animals' shared characteristics with humans potentially salient, informs perceptions of animals, this research did not analyse (dis)similarity to humans specifically. Additionally, findings were not analysed in relation to individual species (e.g., dogs vs. pigs), limiting the ability to say how much similarity applies to pet speciesism specifically, and this research has not yet been applied to the SCM/BIAS map. Further, whilst this research measured perceived immorality of consuming the animal and feelings of guilt, alongside moral perceptions of animals (Leach et al., 2021), the research did not assess behavioural intentions towards animals, thereby limiting generalisability to real-world behaviour.

Due to dogs' status as 'psychological kin' (Topolski et al., 2013), and frequent classification of pet animals as ingroup members (McConnell et al., 2019), a) dogs should be deemed more similar to humans than pigs are, and b) dogs' greater similarity should inform their greater warmth and competence and more positive behavioural intentions towards them. This thesis uniquely tests these hypotheses by exploring, firstly, if similarity is associated with pet speciesism (Study 1) and, secondly, if similarity causes pet speciesism (Studies 4-5).

1.3.4. Species Status

Pet speciesism may also arise from the status an animal holds within the society the animal resides in ('*categorisation*'; Bratanova et al., 2011). Specifically, animals can be categorised as companion animals (*pet status*), animals used for human benefit (*profit status*), or animals which are annoying or dangerous to humans (*pest status*). Of relevance to pet speciesism are pet status and profit status. Overall, people empathise more with (Signal et al., 2018), have more positive attitudes towards (Hazel et al., 2011; Robbins et al., 2021; Signal et al., 2018; Taylor & Signal, 2009), perceive more emotions in (Wilkins et al., 2015), and attribute greater mind to (Robbins et al., 2021) 'pet' animals over 'profit' animals or 'pests'. Additionally, mere labelling of animals as 'edible' (vs. 'non-edible') or 'food' (vs. not 'food'), which both manipulate animals' profit status, negatively impact perceptions of animals, such as by reducing animals' perceived capacity to suffer (Bastian et al., 2012a; Bilewicz et al., 2016; Bratanova et al., 2011). Equivalent studies causally manipulating pet status have not yet been conducted, and profit status findings have not yet been applied to pet speciesism specifically. Additionally, neither pet nor profit status have been investigated utilising the SCM/BIAS map. Thus, this thesis uniquely extends previous findings by causally manipulating pet and profit status to investigate pet speciesism using the SCM/BIAS map.

Due to the ubiquitous presence of dogs within households in countries such as the United Kingdom (Bedford, 2022), compared to pigs' inability to be legally classified as pets (DEFRA, 2014), a) dogs should be viewed as having greater pet status than pigs (López-Cepero et al., 2021), and b) dogs' greater pet status should inform their greater warmth and competence and more positive behavioural intentions towards them. Additionally, due to pigs' commonplace usage in meat production (DEFRA, 2022), compared to sales of dog meat being illegal (Ares & Sutherland, 2019), a) pigs should be viewed as having greater profit status than dogs (López-Cepero et al., 2021), and b) pigs' greater profit status should inform their lower warmth and competence and more negative behavioural intentions towards them. This thesis uniquely tests these hypotheses by exploring, firstly, whether pet and profit status are associated with pet speciesism (Study 1) and, secondly, whether pet status causes pet speciesism (Study 6). Study 6 did not assess causal effects of profit status due to lack of significant relationships between profit status and pet speciesism within Study 1.

1.4. Gaps in the Literature and Research Questions (RQs)

This thesis builds upon speciesism, social psychological, and human-animal interaction ('anthrozoological') literature to determine extrinsic causes of pet speciesism for the first time. Due to greater flexibility in altering extrinsic (vs. intrinsic) factors, determining extrinsic causes of pet speciesism has the potential to inform interventions to decrease or prevent pet speciesism, and thus to reduce (pig) meat consumption, improve pig welfare, and enhance advocacy for pigs. Yet, previous literature has focussed exclusively on intrinsic causes of pet speciesism (e.g., appearance; Archer & Monton, 2011), instead of extrinsic causes. Possible extrinsic causes include behavioural and subjective self-relevance, familiarity and similarity, pet status and profit status. Effects of these variables on perceptions of animals have not yet been tested causally and/or these variables have not yet been applied to pet speciesism specifically or to the SCM/BIAS map. The gaps in literature lead to the following RQs: a) What variables are associated with pet speciesism? (Study 1) and b) What variables cause pet speciesism? (Studies 2-6). Therefore, this thesis aims, firstly, to determine which variables (behavioural self-relevance, subjective self-relevance, familiarity, similarity, pet status, profit status) are significantly associated with pet speciesism (Study 1) and, secondly, to explore which variables significantly cause pet speciesism (Studies 2-6). Specifically, the thesis tests causal effects of behavioural and subjective self-relevance (Studies 2-3), familiarity and similarity (Studies 4-5), and pet status (Study 6), on perceptions of an unknown animal (to test if these variables causally impact perceptions of animals more generally) or dogs and pigs (to apply to pet speciesism specifically). Possible causal effects are tested only for variables identified as significant regressors of pet speciesism within Study 1. This thesis is designed to inform interventions to reduce or prevent pet speciesism, meaning variables must demonstrate a robust causal effect on behavioural intentions to effectively inform interventions. Robust causal effects are defined as those arising in variables which do not have floor or ceiling effects and variables which have adequate scale reliability. As such, possible causal effects on SCM/BIAS map perceptions of dogs and pigs are tested only for variables which are found to robustly inform behavioural intentions towards unknown animals.[2]

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[2] An exception is made for variables which do not robustly inform behavioural intentions and yet also are not successfully manipulated (as determined by failed manipulation checks), whereby amended manipulations are employed to determine causal effects of these variables on perceptions of unknown animals, dogs, and pigs.

Chapter 2. Study 1: Exploring Regressors of Pet Speciesism[3]

2.1. Introduction

As discussed within Chapter 1, this thesis aims to determine why pet speciesism occurs in order to inform interventions to reduce or prevent pet speciesism, thereby decreasing (pig) meat consumption and protecting pig welfare. Whilst previous research has identified intrinsic causes of pet speciesism (e.g., responsiveness, Pérez Fraga et al., 2021), cultural, historical, and individual differences in perceptions of dogs and pigs indicate perceptions of these animals are also informed by extrinsic factors. Moreover, extrinsic factors are more flexible to change, and thus more easily manipulated in interventions. This study thereby forms the foundation for subsequent studies within this thesis by determining significant extrinsic regressors of pet speciesism, which are tested for causal roles in pet speciesism within Studies 2-6. Pet speciesism is measured within this study (and throughout subsequent studies) via dogs' and pigs' warmth and competence, whereby warmth and competence are measured through the warmth and competence subscales from Sevillano and Fiske (2016b), shortened and adapted from Fiske et al. (2002). Higher warmth and/or competence for dogs and pigs indicates more positive perceptions of that species.

Before exploring regressors of pet speciesism, I first aim to explore if a) pet speciesism is indeed evidenced in terms of warmth and competence, in line with the SCM (Sevillano & Fiske, 2016b), and; b) assumptions about dogs being deemed more familiar, more similar to humans, less as 'profit' animals, and more as 'pet' animals compared to pigs (discussed in Chapter 1 and below) are supported, whereby familiarity, similarity, pet status, and profit status are all measured through single items asking how familiar/similar/how much

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[3] This study has been published in *People and Animals: The International Journal of Research and Practice (PAIJ)*: Gradidge, S., Zawisza, M., Harvey, A. J., & McDermott, D. T. (2022). Farmyard animal or best friend? Exploring predictors of dog vs. pig pet speciesism. *People and Animals: The International Journal of Research and Practice, 5*(1), 11. https://docs.lib.purdue.edu/paij/vol5/iss1/11

of a pet/how much of a 'profit' animal the participant considers dogs and pigs to be. First, following previous SCM research (Sevillano & Fiske, 2016b), I hypothesise that:

H1: Dogs will be deemed significantly warmer (**a**) and more competent (**b**) than pigs (i.e., pet speciesism will be evidenced).

Second, due to the high prevalence of dogs kept as pets within households (Bedford, 2022) and therefore high levels of day-to-day contact with dogs, I predict that:

H2: Dogs will be deemed significantly more familiar to humans than pigs are.

Third, due to dogs' status as 'psychological kin' (Topolski et al., 2013), and frequent classification of pet animals as ingroup members (McConnell et al., 2019), I hypothesise that:

H3: Dogs will be deemed significantly more similar to humans than pigs are.

Fourth, due to pigs' commonplace usage in meat production (DEFRA, 2022), compared to sales of dog meat being illegal (Ares & Sutherland, 2019), I predict that:

H4: Pigs will be viewed significantly more as profit animals than dogs.

Fifth, due to the ubiquitous presence of dogs within households in countries such as the United Kingdom (Bedford, 2022), compared to pigs' inability to be legally classified as pets (DEFRA, 2014), I hypothesise that:

H5: Dogs will be viewed significantly more as pet animals than pigs.

After exploring evidence for pet speciesism and the assumptions discussed above, this study will explore possible regressors of pet speciesism, whereby possible regressors are informed by social psychological and speciesism literature bases as discussed within Chapter 1 and below: behavioural self-relevance, subjective self-relevance, similarity, familiarity, pet status, and profit status. Subjective self-relevance is measured through the Product

Involvement Scale (Jain & Srinivasan, 1990; Kim, 2006; Luna & Kim, 2009) adapted to refer to pig products specifically. Behavioural self-relevance is measured through a single item asking how many pig products the participant consumes per week, whilst familiarity, similarity, pet status, and profit status are also all measured through single items asking how familiar/similar/how much of a pet/how much of a 'profit' animal the participant considers dogs and pigs to be.

In regard to regressors, this study aims to, firstly, determine whether consumption and enjoyment of pig meat (behavioural and subjective self-relevance) are associated with more negative perceptions of pigs, in line with previous self-relevance literature (Loughnan et al., 2010; Piazza & Loughnan, 2016). Specifically, due to cognitive dissonance and motivated cognition (Loughnan et al., 2010; Piazza & Loughnan, 2016; Rothgerber, 2020), people may be motivated to view pigs negatively (in terms of warmth and competence) when they consume pigs (behavioural self-relevance) and/or when they like consuming pigs (subjective self-relevance), as devaluing of pigs justifies them being consumed. Before exploring the above causally in later studies, this study thus aims to first explore any correlational relationship between behavioural and subjective self-relevance of pigs and pigs' warmth and competence, hypothesising that:

> **H6:** Greater behavioural (**a**) and subjective (**b**) self-relevance will be significantly associated with lower warmth and competence of pigs.

Secondly, this study aims to investigate whether familiarity with, and perceived similarity of, dogs and pigs are associated with more positive perceptions of both species, expanding upon previous social psychological literature (Auger & Amiot, 2019b; Leach et al., 2021). Specifically, people typically prefer animals with which they are more familiar (e.g., through imagined contact; Auger & Amiot, 2019b). Research on familiarity with human outgroups suggests positive effects of familiarity through intergroup contact operate through reducing negative affect (e.g., intergroup anxiety; Pettigrew & Tropp, 2008), and increasing positive affect (Tausch & Hewstone, 2010), towards the outgroup. Therefore, presumed greater day-to-day contact and familiarity with dogs (see **H2** above) may enhance positive affect, and reduce negative affect, towards dogs, thus improving dogs' perceived warmth and competence (compared to pigs). Regarding similarity, animals are viewed more positively when they are deemed similar to humans (vs. not; Batt, 2009; Kozachenko & Piazza, 2021; Possidónio et al., 2019), or when described as having 'human-like' mental characteristics (vs. not; Leach et al., 2021). Such similarity to humans enables 'humanisation' of animals by encouraging inclusion of animals within our moral circle, and thereby enhances moral concern for them (Bastian et al., 2012): As such, positive effects of similarity may extend to the SCM, whereby an animals' greater perceived similarity to humans (e.g., dogs compared to pigs; see **H3** above) would theoretically inform the animal's greater perceived warmth and competence. Before exploring the above causally in later studies, this study aims to explore first any correlational relationship between familiarity/similarity of dogs and pigs, and their warmth and competence, predicting that:

H7: Greater familiarity with either dogs (**a**) or pigs (**b**) will be significantly associated with greater warmth and competence of that species.

H8: Greater similarity with either dogs (**a**) or pigs (**b**) will be significantly associated with greater warmth and competence of that species.

Thirdly, this study explores whether the degree to which dogs and pigs are deemed companion animals (pet status), or as animals used for human benefit (profit status), are associated with more positive or negative perceptions respectively of dogs and pigs, corroborating previous species status literature (Signal et al., 2018; Taylor & Signal, 2009).

Specifically, people view pet animals more positively than profit animals (Signal et al., 2018; Taylor & Signal, 2009), whereby the simple labelling of an animal as a ‘pet’ engenders positive perceptions of the animal, and the simple labelling of an animal as a ‘profit’ animal engenders negative perceptions of the animal. These findings are underpinned by ‘categorisation’ theory, whereby the mere categorisation of an animal into a group (i.e., ‘pet’ or ‘profit’) informs how people perceive the animal (Bratanova et al., 2011). As such, presumed labelling of pigs as ‘profit’ animals (see **H4** above) and dogs as ‘pets’ (see **H5** above) may explain why pigs are viewed as less warm and competent compared to dogs. Before exploring the above causally in a later study, this study aims to first explore any correlational relationship between pet/profit status of dogs and pigs, and their warmth and competence, hypothesising that:

H9: Greater pet status of either dogs (**a**) or pigs (**b**) will be significantly associated with greater warmth and competence of that species.

H10: Greater profit status of either dogs (**a**) or pigs (**b**) will be significantly associated with lower warmth and competence of that species.

Finally, this study aims to assess if individual differences variables *(support for animal utility, empathy towards animals*) are associated with perceptions of dogs and pigs, and therefore whether they may moderate effects of pet speciesism. Specifically, *support for animal utility* refers to how much people morally approve of using animals for human benefit (Kendall et al., 2006), whilst *empathy towards animals* refers to how much someone feels concern and care for animals; Powell, 2010). Whilst there are alternative individual differences variables which likely impact and/or inform pet speciesism (e.g., *social dominance orientation*; Dhont et al., 2014), these two specific variables were selected from extant speciesism and human-animal interaction literature for three main reasons: a) these variables focus on perceptions of animals specifically, rather than broader prejudicial attitudes and/or perceptions of hierarchy, which do not reflect animal-directed prejudice specifically, b) they capture dichotomous and opposite perceptions of animals, with support for animal utility measuring negative, domineering perceptions of animals and empathy towards animals measuring positive, caring perceptions of animals, and c) they bridge the gap between anthropocentric and pet speciesism by exploring how broader perceptions of animals' inferiority or equality to humans (anthropocentric speciesism) apply to perceptions of different types of species (pet speciesism). Additionally, both individual differences variables may moderate pet speciesism: For example, individuals with a stronger belief in humans being superior to other animals view animals more negatively (Monteiro et al., 2017), especially 'food' animals (Krings et al., 2021), and may thus exhibit greater pet speciesism. In contrast, empathy towards animals correlates with more positive views of animals (Apostol et al., 2013; Hills, 1995; Signal & Taylor, 2007; Taylor & Signal, 2005), and may thus result in lower pet speciesism. Neither support for animal utility nor empathy towards animals have yet been applied to perceptions of dogs and pigs, pet speciesism, nor to the SCM/BIAS map. The current study therefore uniquely tests if empathy towards animals and support for animal utility are associated with pet speciesism, whereby empathy towards animals and support for animal utility are both measured through scales as follows respectively: Empathy Towards Animals Scale (Powell, 2010, adapted from Davis, 1980, 1983) consisting of two subscales (empathic concern and perspective-taking), and Animal Utility Scale (Kendall et al., 2006). Based on the previously discussed previous research, I predict that:

> **H11:** Greater empathy for animals will be significantly associated with greater warmth and competence of dogs and pigs.

H12: Greater support for animal utility will be significantly associated with lower warmth and competence of dogs and pigs.

2.2. Methods

2.2.1. Participants

Two-hundred-and-seventy-six participants were recruited via volunteer sampling. Thirty-nine participants were excluded for providing partial data only (e.g., not completing all scales), whilst another five participants were excluded for failing the attention check. The regressions included diet and gender as covariates, as both variables influence perceptions of animals (Apostol et al., 2013; Herzog, 2007; Lund et al., 2016; Rothgerber, 2015; see Section 2.3 for further discussion). To dummy code diet into non-meat consumer (coded as zero, including vegans, vegetarians, and pescatarians; *n*=74) and meat consumer (coded as one; *n*=138), 12 participants were excluded in total due to being flexitarians (*n*=5)*,* indicating they would rather not say (*n*=3)*,* not consuming pig meat (*n*=2)*,* providing an 'other' response (*n*=1)*,* or giving no response (*n*=1)*.* To dummy code gender into women (coded as zero; *n*=172) and men (coded as one; *n*=40), eight participants were excluded due to indicating they would rather not say (*n*=4)*,* being non-binary (*n*=3), or providing an 'other' response (*n*=1). Exclusions left a sample size of 212 for the regressions (81.1% women, 18.9% men; M_{age}=28.71, SD_{age}=10.93, age range=18-66). Demographics of the sample are reported as follows in percentages, with demographic categories which make up less than 2% of the sample being collapsed into 'other'. For dietary group: 65.1% (meat consumer), 13.7% (vegan), 12.7% (vegetarian), and 8.5% (pescatarian). For nationality: 47.2% (British), 12.3% (United States), 4.7% (Malaysian), 3.8% (Portuguese), 2.8% each (French, German), and 26.4% other. For ethnicity: 75.7% (White), 13.3% (Asian), 5.8% (mixed), 3.3% (Black), and 1.9% other. For country of residence (M_{duration} = 21.82, SD_{duration} = 14.69, range: 1 month to

66 years): 59% (United Kingdom), 15.1% (United States), 4.2% (Malaysia), 2.4% each (Australia, France), and 16.9% other.

The sample size of 212 exceeds the minimum required sample size of 131 per an *a priori* power analysis conducted via G*Power for a multiple regression analysis ('fixed model, R^2 deviation from zero', medium effect size of $f^2 = .15$, 13 regressors, $\alpha = .05$, power = .8). A medium effect size has been chosen throughout this thesis for *a priori* power analyses, due to previous pet speciesism findings being typically of medium size (Gradidge et al., 2021b).

2.2.2. Design

This study follows a regression design with 13 regressors (behavioural and subjective self-relevance of pigs, familiarity, similarity, pet status and profit status of dogs and pigs, empathic concern towards animals, perspective taking of animals, support for animal utility), and four outcome variables (dogs' warmth, dogs' competence, pigs' warmth, pigs' competence). Perceptions of dogs and pigs were analysed separately to determine if perceptions of animals differ across species. Diet and gender were included as covariates for the regressions.

2.2.3. Materials

2.2.3.1. Empathy Towards Animals (Powell, 2010, adapted from Davis, 1980, 1983).

Empathy towards animals was measured via the Empathy Towards Animals Scale (Powell, 2010; adapted from the Interpersonal Reactivity Index; Davis, 1980, 1983; Appendix 1a), whereby participants answered 12 items on a Likert scale from one ('*not at all*') to five ('*very much*'). A sample item is '*I often have tender, concerned feelings for animals who suffer misfortune*'. Statements two, four, five, and ten (e.g., '*I sometimes find it* *difficult to see things from an animal's point of view*') were reverse-scored. The Interpersonal Reactivity Index has adequate test-retest reliability (*r*=.61-81; Davis, 1980), and adequate convergent and discriminant validity (Davis, 1983). The scale consists of two subscales: empathic concern (*α*s=.68-.73; Davis, 1980) and perspective-taking (*α*s=.71-.75; Davis, 1980). Thus, items one to seven were summed to calculate an 'empathic concern' score, and items eight to 12 were summed to calculate a 'perspective taking' score, with higher scores on either subscale indicating higher levels of that variable. Reliability was adequate within this study (empathic concern: ω=.82; 95% BCa CI [.74, .87]; perspective-taking: ω=.84; 95% BCa CI [.79, .88]), whereby adequate reliability is interpreted throughout this thesis as $\omega \geq .7$ (Dunn et al., 2014). Hierarchical ω is reported throughout this thesis due to concerns with Cronbach's α, such as its assumption that items are perfectly correlated (Dunn et al., 2014), and α being easily impacted by the number of scale items (Vaske et al., 2017). Additionally, hierarchical ω is used instead of coefficient ω, as hierarchical ω allows for correlations between errors (Kelley & Pornprasertmanit, 2016). ω and its associated bootstrapped 95% confidence interval (1,000 bootstrap samples) were calculated through the *R* MBESS package (Kelley, 2022).

2.2.3.2. Support for Animal Utility (Kendall et al., 2006).

Support for animal utility was measured via the Animal Utility Scale (Kendall et al., 2006; α=.65 from Kendall et al., 2006; Appendix 1b), whereby participants answered three items on a Likert scale from one ('*strongly disagree*') to seven ('*strongly agree*'). Items were summed to provide a support for animal utility score, 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 were reverse-scored. The scale has adequate validity (Cembalo et al., 2016). However, reliability was inadequate within this study (ω=.58; 95% BCa CI [.45, .68]). I therefore ran a principal axis factor analysis (PAFA; see Appendix 2a for further detail) with direct oblimin rotation to assess factorial validity, alongside assessing inter-item correlations to further test reliability, and communality values to test common variance. Throughout this thesis, communality values, factor loadings, and inter-item correlations were considered conjointly when deciding whether to retain or remove an item from a scale. All three items adequately loaded onto one factor (≥ .45, whereby adequate loading is ≥ .4; Field, 2018), indicating acceptable factorial validity. Communality was adequate for the second item (.66; whereby values should ideally be ≥ .4; Tabachnick & Fidell, 2019), but lower for the first (.2) and third (.28) items. However, the first and third items had acceptable factor loadings, and communality values can still be considered adequate (though not ideal) if ≥ .2 (Child, 2006). Additionally, whilst item one and item three correlated inadequately with each other, *r*=.24 (whereby inadequate inter-item correlation is *r* ≤ .3; Field, 2018), both items correlated adequately with item two, *r*s ≥ .36. I therefore retained all items. However, findings with this scale should be interpreted with caution due to inadequate reliability.

2.2.3.3. Perceived Familiarity of Dogs and Pigs.

Perceived familiarity of dogs and pigs was measured by a single item developed by the researcher '*How familiar do you perceive the following animals [dogs/pigs] to be to you?*' on a Likert scale from one ('*not at all*') to five ('*very much*'). A higher score indicates greater familiarity. This item was informed by previous research, which has measured familiarity of animals using a similar single item (Possidónio et al., 2019).

2.2.3.4. Perceived Similarity of Dogs and Pigs.

Perceived similarity of dogs and pigs was measured by a single item developed by the researcher '*How similar do you perceive the following animals [dogs/pigs] to be to humans?*' on a Likert scale from one ('*not at all*') to five ('*very much*'). A higher score indicates greater similarity. This item was informed by previous research, which has measured similarity of animals using a similar single item (Possidónio et al., 2019).

2.2.3.5. Perceived Pet Status of Dogs and Pigs.

As a scale to measure pet status has not yet been developed, perceived pet status of dogs and pigs was measured by a single item developed by the researcher which holds face validity: '*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)?*' on a Likert scale from one ('*not at all*') to five ('*very much*'). A higher score indicates greater pet status.

2.2.3.6. Perceived Profit Status of Dogs and Pigs.

As a scale to measure profit status has not yet been developed, perceived profit status of dogs and pigs was measured by a single item developed by the researcher which holds face validity: '*How much do you perceive the following animals [dogs/pigs] 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 one ('*not at all*') to five ('*very much*'). A higher score indicates greater profit status.

2.2.3.7. Subjective Self-Relevance of Pigs (Jain & Srinivasan, 1990; Kim, 2006; Luna & Kim, 2009).

Subjective self-relevance of pigs was measured via an adapted version of the Product Involvement Scale (Jain & Srinivasan, 1990; Kim, 2006; Luna & Kim, 2009; α=.86 from Kim, 2006; Appendix 1c), whereby participants indicated their level of agreement with three statements regarding pig products (e.g., ham, pork, bacon) on a Likert scale from one ('*strongly disagree*') to seven ('*strongly agree*'). This scale was adapted here by a) utilising a Likert scale instead of a semantic differential to reduce cognitive effort and ease scale completion (Friborg et al., 2006), and b) referring to pig products specifically. A sample item is '*I am very interested* *in products made from pigs (e.g., pork, ham)*'. Due to the adaptations, I ran a PAFA (Appendix 2b) with direct oblimin rotation to test factorial validity, alongside assessing inter-item correlations to test reliability, and communality values to test common variance. The PAFA revealed inadequate loading of the third item '*I am not indifferent to products made from pigs (e.g., pork, ham)*' onto the factor (.32), whilst the first two items adequately loaded onto one factor ($\geq$ .87). The third item also correlated inadequately with the first and second items, *r*s=.27, and had inadequate communality (.1). Therefore, I removed the third item, creating a two-item subjective self-relevance index. Higher scores indicate greater subjective self-relevance of pigs (i.e., greater involvement with pig products). Neither item was reverse-scored. Reliability was adequate within this study per the Spearman-Brown coefficient (r_{sb}=.86). I report the Spearman-Brown coefficient to check reliability for two-item scales throughout this thesis, per Eisinga et al. (2012). Adequate reliability is interpreted throughout as $r_{\text{sb}} \geq .7$.

2.2.3.8. Behavioural Self-Relevance of Pigs.

As a scale to measure behavioural self-relevance has not yet been developed, behavioural self-relevance of pigs was measured via a single item developed by the researcher '*How many days a week do you eat products made from pigs (e.g., ham, pork, sausages, bacon)*?' from zero to seven days per week. A higher score indicates greater behavioural self-relevance (i.e., greater consumption of pig products).

2.2.3.9. Warmth and Competence of Dogs and Pigs (Sevillano & Fiske, 2016b).[4]

Warmth (α=.83 from Sevillano & Fiske, 2016b) and competence (α=.87 from Sevillano & Fiske, 2016b) were measured via shortened warmth and competence subscales

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[4] Unlike all subsequent studies, behavioural intentions are not measured in the current study, as inclusion of behavioural intentions would significantly increase the number of regression analyses required (from four to 12), and thus increase Type I error.

(Sevillano & Fiske, 2016b, adapted from Fiske et al., 2002). Participants indicated how much they viewed dogs and pigs as '*warm*', '*well-intentioned*' and '*friendly*' (warmth), and '*competent*', '*skillful*' and '*intelligent*' (competence), on a Likert scale from one ('*not at all*') to five ('*extremely*'). Items within each subscale were summed to provide warmth and competence scores, with higher scores indicating greater levels of that variable. No items were reverse-scored. The warmth and competence subscales have adequate discriminant and convergent validity (Diamantopoulos et al., 2017). Reliability was adequate across species within this study (dog warmth: ω=.88, 95% BCa CI [.82, .91]; dog competence: ω=.88, 95% BCa CI [.84, .9]; pig warmth: ω=.89, 95% BCa CI [.85, .92]; pig competence: ω=.91, 95% BCa CI [.87, .93]).

2.2.4. Procedure

2.2.4.1. General Procedure.

All studies throughout this thesis shared procedural details as follows: All studies were approved by Anglia Ruskin University's (ARU's) Psychology and Sport Science School Research Ethics Panel per British Psychological Society ethical code of conduct and General Data Protection Regulation legislation. Participants had to be 18+. Studies were conducted online via Qualtrics. Before taking part, participants read a participant information sheet, followed by providing informed consent. After reading and completing measures and manipulations specific to each study, participants could indicate their thoughts on the study, reported technical difficulties, and offered final comments via a textbox, before being debriefed.

2.2.4.2. Study 1 Procedure.

Participants were recruited via social media, posters, flyers, and Sona (Appendix 3). The study was conducted in October and November 2019 as a voluntary, open survey. After providing informed consent, participants completed the scales in the order listed in Section

2.4.3., followed by answering demographic questions, before being debriefed. Participants completed an attention check '*If you are reading this statement, please choose option 3 "Somewhat"*' within the Empathy Towards Animals scale to ensure participants were reading the statements. Five participants were excluded for failing this attention check. Seven participants reported technical difficulties, but responses were complete and maintained within analyses. ARU undergraduate psychology students (*n*=13) received 0.25 Sona credits as reimbursement.

2.3. Analyses

A one-way (species: dog vs. pig) within-subjects multivariate analysis of variance (MANOVA) was conducted with warmth, competence, familiarity, similarity, pet status, and profit status as the dependent variables (DVs).

Four multiple regressions with 13 regressors each (behavioural and subjective self-relevance of pigs, familiarity, similarity, pet and profit status of dogs and pigs, empathic concern towards animals, perspective taking of animals, support for animal utility) were run on the four outcome variables: dog warmth, dog competence, pig warmth, and pig competence. As extensive literature has found that women and men (Apostol et al., 2013; Herzog, 2007), and meat consumers and non-meat consumers (Lund et al., 2016; Rothgerber, 2015), respectively, differ in how they perceive animals, participant diet and gender may impact regression findings. As such, diet and gender were included as covariates within these multiple regressions, in order to adjust the regression model to account for these variables, thereby reducing variability and bias in the findings (Keen & Tiemeier, 2022).

2.3.1. General Analytical Strategy Across Studies

Throughout this thesis, most tests of differences are conducted utilising MANOVA, whereby DVs are combined into a single multivariate construct, instead of ANOVA, due to conceptual and/or statistical relationships between DVs. Conceptual relationship refers to when DVs arise from the same theoretical framework and/or are subscales within the same overall scale, whilst statistical relationship refers to either positive or negative moderate correlations between DVs (whereby moderate correlations are defined within this thesis as *r*s ≥ ±.3; Field, 2018). When DVs are conceptually and/or statistically related, they should be combined into a single construct within MANOVA to account for the underlying relationships between the DVs (Field, 2018; Tabachnick & Fidell, 2019). Additionally, due to the presence of multiple DVs throughout the studies in this thesis, conducting a MANOVA (as opposed to separate ANOVAs for each and every DV) controls for Type I error (Field, 2018; Tabachnick & Fidell, 2019). Conceptual and statistical relationships between DVs specific to each study are reported in the relevant study chapter. For the current study, warmth and competence conceptually arise from the same theoretical framework (SCM) and constitute subscales within the same overall scale. Pet status and profit status also conceptually arise from the same theoretical framework of categorisation. Statistically, many of the DVs correlated with each other equal to or stronger than ±.3, as assessed through Pearson correlations. Therefore, MANOVA was deemed appropriate within the current study.

All MANOVAs throughout this thesis were conducted using the following procedures: Normality for each DV across each condition was tested as a proxy for multivariate normality, whereby normality was assessed through Kolmogorov-Smirnov tests of normality and skewness across conditions. DVs which failed Kolmogorov-Smirnov tests but had skewness within acceptable boundaries (-2 to 2; Kim, 2013; West et al., 1995) were judged to be acceptably normal. Where normality was violated, I proceeded with the MANOVA, as MANOVA is robust to non-normality (Blanca et al., 2017), especially when group sizes are approximately equal (Field et al., 2012). Multivariate outliers were assessed by Mahalanobis distance values. Multicollinearity between DVs across conditions was assessed through Pearson correlations. Linear relationships between DVs across conditions were assessed by visually inspecting scatterplots. If this assumption was not met, I proceeded with the MANOVA, but the analysis may suffer from lower statistical power (Tabachnick & Fidell, 2014). For MANOVAs including between-subjects IVs, homogeneity of variances is assessed using Levene's test for equality of variances, whilst homogeneity of covariances is assessed using Box's M test. Where homogeneity of variances is not present, analyses should be robust to heterogeneity of variances due to approximately equal numbers of participants per condition (Field et al., 2012; Field, 2018). Where homogeneity of covariances is not present, statistics report Pillai's trace instead of Wilks' lambda.

Significant multivariate effects from MANCOVAs were followed up with univariate ANCOVAs for each DV, unless otherwise stated. *Post hoc* pairwise comparisons with a Bonferroni adjustment were in turn run to investigate some significant findings from the follow-up ANCOVAs (e.g., interactions or main effects for IVs with more than two levels). For Studies 2-6, mediation analyses were conducted to test the full BIAS map model. Effect sizes are mostly reported throughout this thesis using η_p^2, defined as small (η_p^2=.01), medium (η_p^2=.06), or large (η_p^2=.14; Richardson, 2011). For significant *post hoc* pairwise comparisons, Cohen's *d* is reported instead, defined as small (*d*=.2), medium (*d*=.5), or large (*d*=.8; Cohen, 1988).

2.3.2. Statistical Assumptions to Test H1-H5: Exploring Dog vs. Pig Differences Across Warmth, Competence, Familiarity, Similarity, Profit Status and Pet Status (MANOVA)[5]

All DVs failed normality tests, *p*s < .05, but all DVs had acceptable skewness, except for pet status in the dog condition. Due to excessive skewness, multiple extreme univariate

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[5] Note that, as diet and gender are not included as IVs or covariates within this analysis, the sample size of *N*=232 is utilised for this analysis. That is, 20 participants who were excluded from the regression analyses in order to allow diet and gender to be dummy coded did not need to be excluded for this MANOVA analysis also.

outliers, and floor effects in pet status for the dog condition, I also ran a MANOVA excluding pet status as a DV, which did not change multivariate conclusions. I therefore report the MANOVA including pet status.

All DVs except pet status either did not have univariate outliers in either condition (competence, similarity), or had non-extreme univariate outliers in the dog condition which did not cause excessive skewness (warmth, familiarity, profit status). There were multivariate outliers for six DVs, critical values ≥ 22.46, $p < .001$. Running the MANOVA including and excluding univariate and multivariate outliers was not possible due to floor effects in pet status. However, running the MANOVA including and excluding univariate and multivariate outliers without pet status as a DV indicated multivariate conclusions did not change, and I therefore report the MANOVA including univariate and multivariate outliers.

There was no multicollinearity, rs ≤ .71. Linear relationships between the DVs were not present across each condition. Running follow-up univariate ANOVAs including and excluding univariate outliers for warmth, familiarity, and profit status did not change conclusions. ANOVAs are therefore reported including univariate outliers. A follow-up non-parametric sign test with continuity correction was run instead of a follow-up ANOVA for pet status, due to excessive skewness, multiple extreme outliers, and floor effects. A non-parametric sign test was run for pet status instead of the alternative non-parametric Wilcoxon signed-rank test, due to failed assumption of symmetrical distribution.

2.3.3. Statistical Assumptions to Test H6-H12: Exploring Regressors of Dogs' and Pigs' Warmth and Competence (Multiple Regressions)

Residuals were approximately normally distributed, as assessed through histograms and P-P plots. Outliers and leverage values (≥ .2) were present. However, excluding outliers and leverage values did not alter main conclusions for three regressions (dogs' warmth, dogs' competence, pigs' warmth). I therefore report the regressions including these outliers and leverage values. Excluding outliers and leverage values did change two conclusions for the regression on pigs' competence (Footnotes 8-9). However, I report this regression including outliers and leverage values to reflect the unamended dataset. There were no highly influential points, as assessed by Cook's distance. There was no multicollinearity between regressors, as assessed through Pearson's correlations (rs $\leq .61$) and VIFs (≤ 2.24). Homoscedasticity and linearity assumptions were approximately met, as determined through inspection of scatterplots of residuals and partial regression plots. Durbin-Watson statistics were within acceptable boundaries for all regressions, $1.85 \leq$ Durbin-Watson ≤ 1.99.

2.3.4. Testing H1-H5: Exploring Dog vs. Pig Differences in Warmth, Competence, Familiarity, Similarity, Profit Status and Pet Status[6]

A one-way (species: dog vs. pig) within-subjects MANOVA was run on warmth, competence, familiarity, similarity, pet status, and profit status to test **H1-H5**. Descriptive statistics for effects of species are shown in Table 1.

2.3.4.1. H1-H5: Multivariate Effects of Species on the Combined DVs.

Species had a significant main effect on the combined DVs, $F(6, 226) = 128.05$, $p < .001$, $\eta_p^2 = .77$ (large-sized). I therefore followed up this significant multivariate effect with univariate ANCOVAs on the DVs (or non-parametric sign test with continuity correction for pet status) below.

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[6] As single Likert items can be argued to be non-parametric (Bishop & Herron, 2015), I also ran two non-parametric Wilcoxon signed-rank tests with species (dog vs. pig) as the IV and familiarity and similarity as the DVs. I also ran a non-parametric sign test with continuity correction with species (dog vs. pig) as the IV and profit status as the DV. These non-parametric analyses revealed identical results to the MANOVA.

2.3.4.2. H1a: Univariate Effects of Species on Warmth.

As predicted: There was a significant effect of species on warmth, $F(1, 231) = 195.81$, $p < .001$, $\eta_p^2 = .46$ (large-sized), whereby dogs were evaluated as significantly warmer than pigs, **supporting H1a.**

2.3.4.3. H1b: Univariate Effects of Species on Competence.

As predicted: There was a significant effect of species on competence, $F(1, 231) = 69.42$, $p < .001$, $\eta_p^2 = .23$ (large-sized), whereby dogs were evaluated as significantly more competent than pigs, **supporting H1b.**

2.3.4.4. H2: Univariate Effects of Species on Familiarity.

As predicted: There was a significant effect of species on familiarity, $F(1, 231) = 231.64$, $p < .001$, $\eta_p^2 = .5$ (large-sized), whereby dogs were evaluated as significantly more familiar than pigs were, **supporting H2.**

2.3.4.5. H3: Univariate Effects of Species on Similarity.

As predicted: There was a significant effect of species on similarity, $F(1, 231) = 61.33$, $p < .001$, $\eta_p^2 = .21$ (large-sized), whereby dogs were evaluated as significantly more similar to humans than pigs were, **supporting H3.**

2.3.4.6. H4: Univariate Effects of Species on Profit Status.

As predicted: There was a significant effect of species on profit status, $F(1, 231) = 349.31$, $p < .001$, $\eta_p^2 = .6$ (large-sized), whereby pigs were deemed profit animals significantly more than dogs, **supporting H4.**

2.3.4.7. H5: Effect of Species on Pet Status.

As predicted: There was a significant effect of species on pet status, $z = 13.65$, $p < .001$, $r=.9$ (large-sized; Cohen, 1988), whereby dogs were deemed to be pets significantly more than pigs, **supporting H5**.

Table 1.

Descriptive Statistics for Effect of Species on Warmth, Competence, Familiarity, Similarity, Profit Status, and Pet Status.

DV	Dog Mean	Dog *SD*	Pig Mean	Pig *SD*
Warmth***	13.14	2.23	10.68	3.03
Competence***	12.45	2.43	10.8	3.19
Familiarity***	4.19	1.02	3.06	1.2
Similarity***	3.67	1.19	3.1	1.15
Profit Status***	1.88	1.12	3.75	1.52
Pet Status***	5[a]	[a]	3[a]	[a]

Note: [a]Median is reported for pet status rather than mean, and the *SD* cannot be reported for pet status, due to use of a sign test with continuity correction rather than an ANOVA.
***$p \leq .001$

2.3.5. Testing H6-H12: Exploring Regressors of Dogs' and Pigs' Warmth and Competence[7]

Four multiple regressions with 13 regressors each (behavioural and subjective self-relevance of pigs, familiarity, similarity, pet and profit status of dogs and pigs, empathic concern towards animals, perspective taking of animals, support for animal utility), including diet and gender as covariates, were run on dog warmth, dog competence, pig warmth, and pig competence to test **H6-H12** (see Table A1 in Appendix 4 for full inferential statistics). The overall model was significant for each outcome variable, ps < .05. Individual regressor results are reported below.

2.3.5.1. H6a: Association Between Behavioural Self-Relevance of Pigs and Pigs' Warmth/Competence.

Contrary to H6a: Behavioural self-relevance was significantly positively associated with pigs' warmth, $F(1, 196) = 7.15, p = .01, \eta_p^2 = .04$ (small-sized), $B = .36, SE = .13$. Specifically, pigs' greater warmth was associated with participants reporting greater

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[7] As single Likert items can be deemed non-parametric (Bishop & Herron, 2015), I also ran non-parametric ordinal logistic regressions. These non-parametric analyses revealed identical results.

consumption of pig food products. **Also not supporting H6a**: Behavioural self-relevance of pigs did not significantly link to pigs' competence, $F(1, 196) = .48$, $p = .49$, $\eta_p^2 = .002$, $B = .01$, $SE = .14$.

2.3.5.2. H6b: Association Between Subjective Self-Relevance of Pigs and Pigs' Warmth/Competence.[8]

Agreeing with H6b: Subjective self-relevance was significantly negatively associated with pigs' warmth, $F(1, 196) = 5.08$, $p = .03$, $\eta_p^2 = .03$ (small-sized), $B = -.31$, $SE = .14$. That is, pigs' lower warmth was associated with participants reporting greater enjoyment from consuming pig food products. **Not supporting H6b:** Subjective self-relevance of pigs did not significantly link to pigs' competence, $F(1, 196) = 3.48$, $p = .06$, $\eta_p^2 = .02$, $B = -.27$, $SE = .15$.

2.3.5.3. H7a: Association Between Familiarity with Dogs and Dogs' Warmth/Competence.

Supporting H7a: Familiarity with dogs was significantly positively associated with dogs' warmth, $F(1, 196) = 14.77$, $p < .001$, $\eta_p^2 = .07$ (medium-sized), $B = .56$, $SE = .15$, whereby dogs' greater familiarity was associated with dogs' greater warmth. **Not supporting H7a:** Familiarity with dogs did not significantly link to dogs' competence, $F(1, 196) = .06$, $p = .81$, $\eta_p^{2<}$ .001, $B = -.05$, $SE = .18$.

2.3.5.4. H7b: Association Between Familiarity with Pigs and Pigs' Warmth/Competence.

Agreeing with H7b: Familiarity with pigs was significantly positively associated with pigs' competence, $F(1, 196) = 7.04$, $p =.01$, $\eta_p^2= .04$ (small-sized), $B = .56$, $SE = .21$, whereby pigs' greater familiarity was associated with pigs' greater competence. **Not**

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[8] When excluding outliers and leverage values, subjective self-relevance of pigs was significantly negatively associated with pigs' competence, $F(1, 186) = 6.31$, $p = .01$, $\eta_p^2 = .03$, $B = -.35$, $SE = .14$, whereby greater subjective self-relevance of pigs was linked to pigs' lower competence.

supporting H7b: Familiarity with pigs did not significantly link to pigs' warmth, $F(1, 196) = 1.07$, $p = .3$, $\eta_p^2 = .01$, $B = .21$, $SE = .2$.

2.3.5.5. H8a: Association Between Similarity of Dogs and Dogs' Warmth/Competence.

Supporting H8a: Perceived similarity of dogs was significantly positively associated with dogs' warmth, $F(1, 196) = 10.17$, $p = .002$, $\eta_p^2 = .05$ (small-to-medium-sized), $B = .43$, $SE = .13$, and dogs' competence, $F(1, 196) = 5.23$, $p = .02$, $\eta_p^2 = .03$ (small-sized), $B = .38$, $SE = .17$. That is, dogs' greater perceived similarity to humans was associated with dogs' greater warmth and competence.

2.3.5.6. H8b: Association Between Similarity of Pigs and Pigs' Warmth/Competence.

Supporting H8b: Perceived similarity of pigs was significantly positively associated with pigs' warmth, $F(1, 196) = 5.12$, $p = .03$, $\eta_p^2 = .03$ (small-sized), $B = .5$, $SE = .22$, and pigs' competence, $F(1, 196) = 11.95$, $p < .001$, $\eta_p^2 = .06$ (medium-sized), $B = .79$, $SE = .23$. That is, pigs' greater perceived similarity to humans was associated with pigs' greater warmth and competence.

2.3.5.7. H9a: Association Between Pet Status of Dogs and Dogs' Warmth/Competence.

Agreeing with H9a: Pet status of dogs was significantly positively associated with dogs' warmth, $F(1, 196) = 14$, $p < .001$, $\eta_p^2 = .07$ (medium-sized), $B = .72$, $SE = .19$, and dogs' competence, $F(1, 196) = 7.81$, $p = .01$, $\eta_p^2 = .04$ (small-sized), $B = .66$, $SE = .24$. That is, dogs' greater pet status was associated with dogs' greater warmth and competence.

2.3.5.8. H9b: Association Between Pet Status of Pigs and Pigs' Warmth/Competence.

Supporting H9b: Pet status of pigs was significantly positively associated with pigs' warmth, $F(1, 196) = 13.69, p < .001, \eta_p^2 = .07$ (medium-sized), $B = .64$, $SE = .17$, and pigs' competence, $F(1, 196) = 8.28, p = .004, \eta_p^2 = .04$ (small-sized), $B = .52$, $SE = .18$. That is, pigs' greater pet status was associated with pigs' greater warmth and competence.

2.3.5.9. H10a: Association Between Profit Status of Dogs and Dogs' Warmth/Competence.

Supporting H10a: Profit status of dogs was significantly negatively associated with dogs' warmth, $F(1, 196) = 11.59, p < .001, \eta_p^2 = .06$ (medium-sized), $B = -.39$, $SE = .12$. That is, dogs' greater profit status was associated with dogs' lower warmth. **Not supporting H10a:** Perceived profit status of dogs did not significantly link to dogs' competence, $F(1, 196) = .95, p = .33, \eta_p^2 = .01, B = -.14, SE = .14$.

2.3.5.10. H10b: Association Between Profit Status of Pigs and Pigs' Warmth/Competence.

Not supporting H10b: Profit status of pigs did not significantly link to pigs' warmth, $F(1, 196) = 1.18, p = .28, \eta_p^2 = .01, B = -.15, SE = .14$, or pigs' competence, $F(1, 196) = .003$, $p = .96, \eta_p^2 < .001, B = -.01, SE = .15$.

2.3.5.11. H11a-b: Association Between Empathic Concern towards Animals and Dogs'/Pigs' Warmth and Competence.[9]

Partly supporting H11a: Empathic concern towards animals was significantly positively associated with dogs' warmth, $F(1, 196) = 12.04, p < .001, \eta_p^2 = .06$ (medium-

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[9] When excluding outliers and leverage values, empathic concern was significantly positively associated with pigs' competence, $F(1, 186) = 6.55, p = .01, \eta_p^2 = .03, B = .13, SE = .05$, whereby greater empathic concern for animals was linked to pigs' greater competence.

sized), $B = .12$, $SE = .03$, and dogs' competence, $F(1, 196) = 9.73$, $p = .002$, $\eta_p^2 = .05$ (small-to-medium-sized), $B = .13$, $SE = .04$. That is, greater empathic concern for animals was associated with dogs' greater warmth and competence. **Also partly consistent with H11b:** Empathic concern towards animals was significantly positively associated with pigs' warmth, $F(1, 196) = 7.69$, $p = .01$, $\eta_p^2 = .04$ (small-sized), $B = .14$, $SE = .05$, whereby greater empathic concern for animal was associated with pigs' greater warmth. However, **partly not supporting H11b,** empathic concern towards animals did not significantly link to pigs' competence, $F(1, 196) = 2.52$, $p = .11$, $\eta_p^2 = .01$ (small-sized), $B = .08$, $SE = .05$.

2.3.5.12. H11a-b: Association Between Perspective Taking of Animals and Dogs'/Pigs' Warmth and Competence.

Partly in support of H11a: Perspective taking of animals was significantly positively associated with dogs' competence, $F(1, 196) = 3.96$, $p = .048$, $\eta_p^2 = .02$ (small-sized), $B = .07$, $SE = .04$. That is, being able to take the perspective of animals was linked to dogs' greater competence. However, **partly not supporting H11a:** Perspective taking of animals was not significantly associated with dogs' warmth, $F(1, 196) = 1.12$, $p = .29$, $\eta_p^2 = .01$, $B = .03$, $SE = .03$. Also, **not supporting H11b:** Perspective taking of animals was not significantly associated with pigs' warmth, $F(1, 196) = .04$, $p = .85$, $\eta_p^2 < .001$, $B = -.01$, $SE = .05$, or pigs' competence, $F(1, 196) = .37$, $p = .54$, $\eta_p^2 = .002$, $B = .03$, $SE = .05$.

2.3.5.13. H12a-b: Association Between Support for Animal Utility and Dogs'/Pigs' Warmth and Competence.

Not supporting H12a and H12b: Support for animal utility was not significantly associated with dogs' warmth, $F(1, 196) = 1.16$, $p = .28$, $\eta_p^2 = .01$, $B = -.05$, $SE = .04$, or dogs' competence, $F(1, 196) = .87$, $p = .35$, $\eta_p^2 = .004$, $B = -.05$, $SE = .05$, nor pigs' warmth, $F(1, 196) = 2.41$, $p = .12$, $\eta_p^2 = .01$, $B = -.1$, $SE = .07$, or pigs' competence, $F(1, 196) = .66$, $p = .42$, $\eta_p^2 = .003$, $B = -.06$, $SE = .07$.

2.4. Discussion

2.4.1. Discussion of Findings

2.4.1.1. H1-H5: Evidence for Dog vs. Pig Differences in Warmth, Competence, Familiarity, Similarity, Profit Status and Pet Status (Pet Speciesism).

Agreeing with previous literature (Bilewicz et al., 2011; Caviola & Capraro, 2020; Gradidge et al., 2021b), pet speciesism was evidenced in the context of the SCM/BIAS map, whereby dogs were deemed warmer (**H1a;** large-sized) and more competent (**H1b;** large-sized) than pigs. Beyond the SCM/BIAS map, dogs were also deemed more familiar (**H2;** large-sized), more similar to humans (**H3;** large-sized), less as profit animals (**H4;** large-sized) and more as pet animals (**H5;** large-sized) than pigs. These findings thus indicate familiarity, similarity, profit status, and pet status could all explain pet speciesism, whereby dogs' greater familiarity, similarity, and pet status, and lower profit status, compared to pigs, may explain why dogs are deemed warmer and more competent than pigs (i.e., why pet speciesism occurs). All pet speciesism findings were large-sized, aligning with previous pet speciesism findings (e.g., Gradidge et al., 2021b).

2.4.1.2. H6a-b: Behavioural and Subjective Self-Relevance of Pigs as Regressors of Pigs' Warmth/Competence.

Referring to regressors of pet speciesism, the current study found that, partially consistent with **H6b**, and agreeing with motivated cognition literature (Loughnan et al., 2010; Piazza & Loughnan, 2016), greater subjective self-relevance was associated with pigs' lower warmth (small-sized). Conversely, greater behavioural self-relevance was associated with pigs' greater warmth (small-sized), which was the opposite direction to predicted (**H6a**), and contrary to previous literature (Loughnan et al., 2010; Piazza & Loughnan, 2016). Partially not supporting **H6a-H6b**, neither behavioural nor subjective self-relevance linked to pigs' competence. These findings thus suggest that a) behavioural and subjective self-relevance link to warmth only and not competence, and b) behavioural and subjective self-relevance differentially relate to warmth (behavioural self-relevance positively, subjective self-relevance negatively). However, these findings were only small-sized, so may have lower practical significance.

The unexpected direction of the relationship between behavioural self-relevance and warmth may be explained by two main possibilities: a) people are morally engaging instead of disengaging (e.g., viewing pigs as more, rather than less, warm as a response to dissonance; see Gradidge et al., 2021a for more information on moral engagement), or b) findings are caused by a third variable due to current findings being non-causal. For instance, people, especially women, can under-report their meat consumption as a strategy to reduce dissonance, by distancing oneself from one's behaviour (Rothgerber, 2019). Thus, as this study is non-causal, and most of the sample is women, participants may have resolved dissonance by under-reporting their pig product consumption and viewing pigs as low in warmth. However, socially desirable responding would theoretically extend to other measures, such as under-reporting one's liking for pig meat (subjective self-relevance), which does not appear to be the case within this study. Therefore, to clarify discrepant findings, Studies 2-3 assess causal effects of behavioural and subjective self-relevance on warmth. Additionally, Studies 2-3 measure reported weekly meat consumption to test for any under-reporting of meat consumption across behavioural and subjective self-relevance conditions.

2.4.1.3. H7: Familiarity as a Regressor of Warmth and Competence.

The current study found greater familiarity with dogs was associated with dogs' greater warmth (medium-sized), whilst greater familiarity with pigs was associated with pigs' greater competence (small-sized). These findings agree with **H7** for dogs' warmth and pigs' competence but may not support **H7** for dogs' competence and pigs' warmth. Additionally, the relationship between familiarity with pigs and pigs' competence was only small-sized, so may have lower practical significance. However, these findings do indicate that familiarity has differing relationships with warmth and competence depending on target species. Whilst positive links between familiarity with dogs or pigs and perceptions of them were expected due to previous literature (Auger & Amiot, 2015, 2016, 2019a, 2019b), differential relationships between familiarity and dogs' warmth vs. pigs' competence were not expected. These differential relationships with familiarity will need to be determined as causal before extensive explanations can be explored for these relationships (Study 4).

2.4.1.4. H8: Similarity as a Regressor of Warmth and Competence.

Supporting **H8** and previous research (Batt, 2009; Leach et al., 2021)**,** this study found greater perceived similarity of dogs or pigs was associated with that species' increased warmth and competence (small-sized for dogs' competence and pigs' warmth; small-to-medium-sized for dogs' warmth; medium-sized for pigs' competence). Findings for dogs' competence and pigs' warmth were only small-sized, so may have lower practical significance. Studies 4-5 expanded upon current findings to assess causal effects of similarity on warmth, competence, and behavioural intentions.

2.4.1.5. H9: Pet Status as a Regressor of Warmth and Competence.

Agreeing with **H9** and previous literature (Signal et al., 2018; Taylor & Signal, 2009), the current study found dogs' or pigs' greater pet status was associated with increased warmth and competence of that species (small-sized for pigs' and dogs' competence; medium-sized for dogs' and pigs' warmth). Findings for dogs' and pigs' competence were only small-sized, so may have lower practical significance. Due to the current findings, the relationship between an animal's pet status and the animals' warmth and competence was tested for causality in Study 6.

2.4.1.6. H10a-b: Profit Status as a Regressor of Warmth and Competence.

The current study found dogs' greater profit status was associated with dogs' decreased warmth (medium-sized), partially supporting **H10a**. However, not supporting **H10a,** profit status of dogs did not link to dogs' competence. The relationship between dogs' profit status and dogs' warmth (yet not dogs' competence) is in line with previous research (Signal et al., 2018; Taylor & Signal, 2009). However, not supporting previous research and **H10b**, pigs' profit status did not link to pigs' warmth or competence. Current findings for profit status thus mostly do not support previous correlational research on the relationship between profit status and perceptions of animals (Signal et al., 2018; Taylor & Signal, 2009), nor causal research on effects of labelling animals as 'food' vs. not 'food' (Bastian et al., 2012a). Therefore, profit status cannot explain why pigs are viewed more negatively than dogs: That is, whilst pigs are indeed deemed profit animals more than dogs, viewing pigs as a profit animal is not associated with their decreased warmth and competence. Due to these null findings, I did not test for causal effects of profit status on perceptions of animals in subsequent experiments.

2.4.1.7. H11: Empathic Concern and Perspective Taking as Regressors of Warmth and Competence.

Greater empathic concern towards animals was associated with greater warmth of dogs and pigs as expected (small-sized for pigs; medium-sized for dogs), partially consistent with **H11** and previous literature (Apostol et al., 2013). Additionally, greater empathic concern towards animals was associated with dogs' greater competence (small-to-medium-sized), also partly supporting **H11.** However, empathic concern did not link to pigs' competence, not supporting **H11**. Additionally, greater perspective taking of animals was associated with dogs' greater competence as expected (small-sized), partly consistent with **H11** and previous literature (Apostol et al., 2013). However, perspective taking of animals unexpectedly did not link to dogs' warmth, nor to pigs' warmth or competence, not supporting **H11**.

As previous research has focussed on overall empathy towards animals (Apostol et al., 2013; Hills, 1995), these findings expand upon previous literature to indicate the relationships between empathy and perceptions of animals depend on the type of empathy (empathic concern, perspective taking), type of perception (warmth, competence), and species (dog or pig). Future research should test the types of empathy on different types of perceptions of animals (e.g., behavioural intentions, moral status, mind attribution), and across perceptions of different species, to investigate boundary conditions of where and when empathy towards animals is linked to more positive perceptions of them. However, current findings indicate empathy towards animals (as measured through empathic concern and perspective taking) does not improve most perceptions of pigs and thereby that empathy towards animals does not lower pet speciesism. I therefore did not test empathy towards animals within further studies in this thesis. Additionally, some findings were only small-sized, so may have lower practical significance.

2.4.1.8. H12: Support for Animal Utility as a Regressor of Warmth and Competence.

Support for animal utility did not link to dogs' and pigs' warmth and competence, not supporting **H12**. These findings may therefore not support previous research (Krings et al., 2021; Monteiro et al., 2017), and suggest that support for animal utility cannot causally impact perceptions of dogs and pigs. The discrepancy in findings between this study and previous literature may arise from differences in measurements of the variables. Specifically, previous research has assessed beliefs in human dominion over animals (Monteiro et al., 2017), whilst this study assessed support for animal utility only. These variables may be related but differ in their valuing of animals: For example, both human dominion over animals and support for animal utility may be linked to anthropocentric speciesism (viewing humans as warmer and more competent than other animals), whilst only human dominion over animals may be linked to not valuing animals at all (e.g., viewing them as extremely low in warmth and competence). As this study found null findings for support for animal utility, I did not test this variable further within subsequent studies in this thesis.

2.4.2. Limitations of the Current Study

The current study has limitations as follows, which are addressed in Studies 2-6: a) lack of causality, b) effects of bias on perceptions of animals, and c) lack of exploration of behavioural intentions.

Firstly, this study only investigated regressors of pet speciesism and does not measure causality. Thus, due to the cross-sectional data within this study, it is impossible to determine causal effects of the regressors on pet speciesism. Subsequent experiments within this thesis therefore intend to determine causality of the significant regressors on pet speciesism. Further studies thus causally manipulate behavioural and subjective self-relevance (Studies 2-3), familiarity (Study 4), similarity (Studies 4-5), and pet status (Study 6), to assess causal effects on perceptions of animals.

Secondly, this study explores perceptions of dogs' and pigs' warmth and competence. Perceptions of known animals may be influenced by bias or preconceptions of these animals, whereby bias and preconceptions act as moderators which obscure the actual relationships between the regressors and pet speciesism. To accurately determine causes of pet speciesism in subsequent experiments, studies will need to causally manipulate possible causal variables with an unknown animal whom participants are less biased towards or against (Studies 2-4 and 6), a method called the '*novel animal paradigm*' (Piazza et al., 2014; Piazza & Loughnan, 2016; Sytsma & Machery, 2012; Section 3.2.3.1.).

Thirdly, this study only assessed perceptions of animals (warmth, competence), without measuring behavioural intentions. As the BIAS map extends from the SCM, whereby warmth and competence typically inform active and passive behavioural intentions respectively (Cuddy et al., 2007), subsequent studies need to also measure behavioural intentions (Studies 2-6). Measurement of these behavioural intentions may enable easier application of significant causes to real-world behaviour (e.g., Webb & Sheeran, 2006), and thus improve real-world applications of interventions to reduce or prevent pet speciesism.

2.5. Conclusion

Firstly, the current study finds evidence for pet speciesism in the context of the SCM/BIAS map, alongside pet speciesism in familiarity, similarity, pet status, and profit status. Secondly, this study finds that pet status, similarity, familiarity, behavioural self-relevance, and subjective self-relevance are all associated with perceptions of dogs and/or pigs. These variables were thus all tested for causality in Studies 2-6. The lack of significant relationship between profit status and perceptions of pigs indicates profit status is incapable of explaining or reducing pet speciesism. Specifically, whilst pigs are deemed profit animals more than dogs, profit status is not associated with pigs' decreased warmth and competence. Regarding individual differences variables, support for animal utility was not associated with perceptions of dogs and pigs. Meanwhile, empathic concern towards animals was associated with dogs' and pigs' greater warmth, and dogs' greater competence, but not with pigs' competence. Perspective taking of animals was associated with dogs' greater competence, but not with dogs' warmth, pigs' warmth, or pigs' competence.

Overall, the current study evidences pet speciesism, and identifies significant regressors of dogs' and pigs' warmth and competence, which are investigated causally in subsequent experiments. This study has limitations including lack of causality, potentially moderating effects of bias in perceptions of dogs and pigs, and lack of measurement of behavioural intentions. Subsequent experiments within this thesis therefore causally manipulate significant regressors from the current study and apply these findings to unknown animals and behavioural intentions as follows: behavioural and subjective self-relevance (Studies 2-3), familiarity (Study 4), similarity (Studies 4-5), and pet status (Study 6).

Chapter 3. Study 2: Causal Exploration of Self-Relevance

3.1. Introduction and Extension from Study 1

Study 1 found that behavioural and subjective self-relevance were associated with pigs' greater and lower warmth respectively, while neither linked to pigs' competence. Whilst the relationship between subjective self-relevance and warmth aligns with previous self-relevance literature and motivated cognition (Loughnan et al., 2010; Piazza & Loughnan, 2016), the relationship between behavioural self-relevance and warmth occurred in the opposite direction to predicted. That is, whilst people who more greatly enjoy consuming pigs viewed pigs as less warm, as expected, people who consume pigs more often unexpectedly viewed pigs as warmer. This finding stands in contrast to motivated cognition theory, as it would be expected that greater consumption of pigs would lead to greater cognitive dissonance, therefore causing people to view pigs as less warm. For instance, actual consumption of beef caused people to view cows as having lower moral status (Loughnan et al., 2010), and such a finding would be expected to extend to other perceptions of animals, such as the SCM (i.e., warmth).

The current study therefore extends the equivocal findings from Study 1 by testing whether these relationships are causal; that is, whether behavioural and subjective self-relevance causally affect warmth, whereby behavioural and subjective self-relevance are causally manipulated within the current study through text manipulations regarding a 'target animal' previously unknown to the participant. Specifically, participants are presented with an imaginary scenario where they are offered meat from an unknown animal, and they are asked to imagine either that they like/dislike this meat (manipulation of subjective self-relevance) and that they agree/refuse to consume this meat (manipulation of behavioural self-relevance). An unknown animal is used for these text manipulations as a modified version of the '*novel animal paradigm*' (Piazza et al., 2014; Piazza & Loughnan, 2016; Sytsma &

Machery, 2012), whereby characteristics of a novel and typically fictional animal are causally manipulated to assess unmoderated effects of amended characteristics on perceptions of the animal. Novel fictional animals are employed instead of known animals to reduce moderating effects of bias or preconceptions on perceptions of the animal. For the current study, and subsequent studies (Studies 3-4 and 6), a real but unknown animal is utilised instead of the typically used fictional animal ('trablans'; Piazza & Loughnan, 2016) to enable a photograph of the animal to be included. Inclusion of such a photograph may enhance effectiveness of the imagined scenarios (Miller & Stoica, 2004).

Therefore, the current study utilises these behavioural and subjective self-relevance manipulations to explore if Study 1 findings regarding self-relevance and warmth are causal, rather than correlational, and to see if motivated cognition theory is supported or not. Note that warmth is measured with the same items from Study 1, which originate from Sevillano and Fiske (2016b).

For subjective self-relevance, in line with above discussed Study 1 findings and motivated cognition literature (e.g., Loughnan et al., 2010), it is hypothesised that:

> **H1**: Animals portrayed as subjectively self-relevant (vs. not) will be seen as significantly less warm.

For behavioural self-relevance, a non-directional hypothesis is proposed, whereby findings may align either with Study 1 or with previous motivated cognition literature (e.g., Loughnan et al., 2010). I therefore predict that:

> **H2**: Animals portrayed as behaviourally self-relevant (vs. not) will either be seen as significantly less warm (**a,** per previous literature; Piazza & Loughnan, 2016), or significantly more warm (**b,** per Study 1).

Note that hypotheses are not made for competence, as Study 1 found a lack of significant relationships between behavioural and subjective self-relevance and competence. However, competence is still measured within the current study, again utilising the same items from Study 1 (Sevillano & Fiske, 2016b).

Alongside testing causal effects of behavioural and subjective self-relevance on warmth, the current study extends these findings to behavioural intentions in line with the BIAS map (Cuddy et al., 2007). Specifically, the current study aims to investigate if behavioural and subjective self-relevance causally affect *active help* (intentional and effortful aid towards the animal), *active harm* (intentional and effortful damage inflicted upon the animal), *passive help* (aid towards the animal without active effort required), or *passive harm* (exclusionary behaviour towards the animal without active effort required), whereby these behavioural intentions are measured within the current study through BIAS map subscales from Sevillano and Fiske (2016b). The BIAS map posits that warmth informs greater active help and less active harm, whilst competence informs greater passive help and less passive harm (Cuddy et al., 2007). Thus, agreeing with the BIAS map, relationships between behavioural and subjective self-relevance and warmth within Study 1 should extend to effects on active help and active harm in the current study. As such, congruent with the BIAS map, I hypothesise that:

> **H3**: If subjectively self-relevant animals (vs. not) are deemed significantly less warm (i.e., **H1** is evidenced), subjectively self-relevant animals (vs. not) will be subject to significantly more active harm (**a**) and less active help (**b**).
>
> **H4**: If behaviourally self-relevant animals (vs. not) are deemed significantly less warm (i.e., **H2a** is evidenced), behaviourally self-relevant animals (vs. not) will be subject to significantly more active harm (**a**) and less active help (**b**).

Beyond assessing causal effects of behavioural and subjective self-relevance, the current study also aims to directly test the *motivated cognition model*. Specifically, this model states self-relevance of the target animal should cause *dissonance* (moral discomfort), due to a contradiction between valuing animals and consuming (or enjoying consuming) them (Gradidge et al., 2021a; Loughnan et al., 2014; Rothgerber, 2020), whereby dissonance is measured within the current study through the Dissonance Affect Questionnaire (negative affect subscale; Harmon-Jones, 2000) both directly after the self-relevance manipulation (post-manipulation dissonance) and after evaluating how warm/competent the animal is (post-evaluation dissonance). As most people like animals and do not want to hurt them (Loughnan et al., 2014), yet within the current study may need to imagine consuming and/or liking meat from an animal, I predict that:

> **H5**: Behaviourally or subjectively self-relevant animals (vs. not) will significantly increase post-manipulation dissonance.

This dissonance in turn should motivate participants to view the target animal more negatively (e.g., through lower warmth) to alleviate the uncomfortable experience of dissonance and justify one's consumption of, or enjoyment of, consuming animals (Gradidge et al., 2021a). As such, to explore the role of dissonance in informing negative perceptions of animals, I hypothesise that:

> **H6**: Post-manipulation dissonance will significantly mediate relationships between behavioural and subjective self-relevance and warmth. That is, behaviourally (**a**) or subjectively (**b**) self-relevant animals (vs. not) will significantly increase post-manipulation dissonance, which will in turn significantly reduce the animal's post-manipulation warmth.

Additionally, to explore if this devaluing of animals through their decreased perceived warmth fulfils the purpose of alleviating dissonance (Gradidge et al., 2021a), I predict that:

> **H7**: The greater post-manipulation dissonance, the lower post-evaluation dissonance, due to the animal's decreased post-manipulation warmth (mediation). That is, warmth will be deliberately significantly decreased by participants as part of motivated cognition to reduce dissonance.

In addition to the above, inclusion of measurements for behavioural intentions within this study also enables replicability of the BIAS map to animals to be tested (Sevillano & Fiske, 2016b, 2019). That is, it can be tested directly if any effects of behavioural and subjective self-relevance on active behavioural intentions are mediated through warmth, in line with both general SCM and BIAS map literature (Cuddy et al., 2007) and SCM/BIAS map literature applied to animals specifically (Sevillano & Fiske, 2016b, 2019). As warmth typically informs active behavioural intentions (Sevillano & Fiske, 2016b, 2019), it is hypothesised that:

> **H8**: Post-manipulation warmth will significantly mediate relationships between behavioural self-relevance and post-manipulation active harm and post-manipulation active help. That is, behaviourally self-relevant animals (vs. not) will significantly decrease post-manipulation warmth, which will in turn significantly increase post-manipulation active harm (**a**) and decrease post-manipulation active help (**b**).

> **H9:** Post-manipulation warmth will significantly mediate relationships between subjective self-relevance and post-manipulation active harm and post-manipulation active help. That is, subjectively self-relevant animals (vs. not) will significantly decrease post-manipulation warmth, which will in turn significantly increase post-manipulation active harm (**a**) and decrease post-manipulation active help (**b**).

Finally, reported weekly meat consumption is included as an exploratory variable within this study to better enable detection of meat consumption under-reporting across behavioural and subjective self-relevance conditions (Rothgerber, 2019), whereby this reporting is measured through a single item '*How many days a week do you consume meat?*'. As reported weekly meat consumption is included as an exploratory variable, no hypotheses are made for this variable.

3.2. Methods

3.2.1. Participants

Three-hundred-and-eighteen participants were recruited via volunteer sampling. Fifty-seven participants were excluded for giving partial responses, 18 participants for failing an attention check, and one participant due to technical difficulties. All analyses included gender and diet as covariates, as both variables influence perceptions of animals (Apostol et al., 2013; Herzog, 2007; Lund et al., 2016; Rothgerber, 2015; see Section 3.3 for further discussion). To dummy code gender into women (coded as zero; n=169) and men (coded as one; n=58), five participants were excluded due to being non-binary (n=2), giving no response (n=2), or indicating they would rather not say (n=1). To dummy code diet into meat consumer (coded as one; n=158) and non-meat consumer (coded as zero; n=69, including vegans, vegetarians, and pescatarians), 11 participants were excluded due to being reducetarian (n=5), flexitarian (n=3), giving no response (n=1), answering N/A (n=1), or indicating they would rather not say (n=1). Exclusions left a sample size of 227 (74.4% women, 25.6% men; M_{age}=27.76, SD_{age}=9.35, age range=18-69), which exceeds the minimum required sample size of 179 per a G*Power *a priori* power analysis for a MANOVA analysis ('repeated measures, within-between interaction', medium effect size f=.25, four groups, two measurements, α=.05, power = .8). Participants within each condition are shown in Table 2. Demographics of the sample are reported as follows in percentages, with demographic categories which make up less than 2% of the sample being collapsed into 'other'. For dietary group: 69.6% (meat consumer), 17.6% (vegetarian), 7.5% (vegan), and 5.3% (pescatarian). For nationality: 54.6% (United Kingdom/British), 9.3% (Indian), 4% (German), 2.6% (no response), 2.2% each (Portuguese, United States), and 25.1% other. For ethnicity: 73.8% (White), 16.7% (Asian), 4.3% (mixed), and 5.2% other. For country of residence (M_{duration}=21.06, SD_{duration}=13.56, range: less than one month to 69 years): 70.4% (United Kingdom), 7.9% (India), 3.5% (Germany), 3.1% each (The Netherlands, United States), and 12% other. For religion: 45% (no religion or N/A), 26.8% (Christianity), 7.5% (Hinduism), 4.4% (agnosticism), 3.5% each (atheism, no response), 3.1% (Islam), and 6.2% other.

Table 2.

Participants Within Each Condition for Study 2.

Behavioural Self-Relevance Condition	Subjective Self-Relevance Condition	Number of Participants
Present	Present	54
Present	Absent	61
Absent	Absent	62
Absent	Present	65

3.2.2. Design

This experiment follows a 2(behavioural self-relevance: present vs. absent; between-subjects) x 2(subjective self-relevance: present vs. absent; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed MANCOVA design, with warmth, competence, active help, passive help, active harm, and passive harm as the DVs. Reported weekly meat consumption, post-manipulation dissonance, and post-evaluation dissonance were included as DVs in a 2(behavioural self-relevance: present vs. absent; between-subjects) x 2(subjective self-relevance: present vs. absent; between-subjects) between-subjects MANCOVA. Gender and diet were included as covariates.

3.2.3. Materials

3.2.3.1. Novel Animal Paradigm (Piazza et al., 2014; Piazza & Loughnan, 2016; Sytsma & Machery, 2012).

The current study employed an adapted version of the *novel animal paradigm* (Piazza et al., 2014; Piazza & Loughnan, 2016; Sytsma & Machery, 2012), whereby stated attributes (e.g., intelligence, harmfulness) of a fictional animal are causally manipulated to assess their unmoderated effects on perceptions of the animal. A fictional animal is typically utilised instead of a real animal to avoid prior perceptions of the animal and bias moderating effects of these causal manipulations on subsequent perceptions of the animal. An adapted version of the paradigm was implemented within this study, whereby a real animal (*Bennett's tree kangaroo* [hereon *tree kangaroo*], *fossa* or *tamandua*) was used instead of a fictional animal to enable a photograph of the animal to be utilised. To enable further elimination of bias, real animals were chosen for the current study and subsequent studies (Studies 3-4 and 6) which are likely to be unknown to most participants due to their relative obscurity (e.g., lack of exposure in media and remoteness from most Western human populations, e.g., Bratanova et al., 2011). In addition, tree kangaroos have been effectively utilised in prior research employing the novel animal paradigm (Bratanova et al., 2011). This animal therefore represents an appropriate target animal. Lack of familiarity with the animal was explicitly checked by asking participants if they recognised the animal ('*Do you recognise this animal?*' Options: '*Yes*' or '*No*'), with participants being directed to the next animal if they answered '*yes*' and excluded from the study if they recognised all animals. Participants completed the entirety of the study about their target animal (tree kangaroo, fossa, or tamandua) only.

3.2.3.2. Animal Photographs.

A photograph was implemented for each target animal to enhance participants' ability to visualise the imagined scenario (Miller & Stoica, 2004), whereby the tree kangaroo photograph was sourced from https://www.shutterstock.com/image-photo/close-shot-cute-tree-kangaroo-168261035, the fossa photograph sourced from https://www.flickr.com/photos/mathiasappel/19504925051, and the tamandua photograph sourced from https://tinyurl.com/2jazjz3s. Photographs faced the animal directly and included the animal as the central focus of the photograph.

3.2.3.3. Behavioural and Subjective Self-Relevance Text Manipulations.

Behavioural and subjective self-relevance were manipulated within this study through an imagined scenario about the participant's target animal as follows: '*Imagine that you like/dislike tree kangaroo meat. You have been offered tree kangaroo meat again. Imagine you agree/refuse to consume the tree kangaroo meat*'. Subjective self-relevance is manipulated through use of the word '*like*' (subjective self-relevance) or '*dislike*' (lack of subjective self-relevance). Behavioural self-relevance is manipulated through use of the word '*agree*' (behavioural self-relevance) or '*refuse*' (lack of behavioural self-relevance). These text manipulations were developed by the current researcher and are informed by previous text and imagined scenarios with animals (Bratanova et al., 2011).

3.2.3.4. Warmth and Competence (Sevillano & Fiske, 2016b).

Warmth and competence were measured with the same items from Study 1 on a Likert scale from one ('*not at all*') to five ('*extremely*'): *warm*', '*well-intentioned*', '*friendly*' (warmth), and '*competent*', '*skillful*', '*intelligent*' (competence; Sevillano & Fiske, 2016b). Items within each subscale were summed to provide warmth and competence scores. Reliability was adequate within this study for warmth (pre-manipulation ω=.85, 95% BCa CI [.79, .89]; post-manipulation ω=.89, 95% BCa CI [.84, .92]), and competence (pre-manipulation ω=.88, 95% BCa CI [.84, .9]; post-manipulation ω=.91, 95% BCa CI [.88, .93]).

3.2.3.5. Behavioural Intentions Towards the Animal (Sevillano & Fiske, 2016b).

Behavioural intentions were measured based on how willing, on a Likert scale from one ('*not at all willing*') to five ('*extremely willing*'), participants were to do the following behaviours to their target animal (Sevillano & Fiske, 2016b): '*support*', '*help*', '*behave friendly towards*', and '*interact with*' the animal (active help; α=.93 from Sevillano & Fiske, 2016b), '*sustain*' and '*conserve*' the animal (passive help; α=.8 from Sevillano & Fiske, 2016b), '*kill*', '*injure*', '*exterminate*', '*trap*', and '*reject*' the animal (active harm; α=.93 from Sevillano & Fiske, 2016b), '*let [the animal] die off*' and '*ignore*' the animal (passive harm; α=.74 from Sevillano & Fiske, 2016b). No items were reverse-scored. Items within each subscale were summed to provide active help, passive help, active harm, and passive harm scores. Higher scores on any subscale indicates higher levels of that variable. Reliability was adequate within this study for active help (pre-manipulation ω=.83, 95% BCa CI [.76, .87]; post-manipulation ω=.84, 95% BCa CI [.78, .88]), passive help (pre-manipulation r_{sb}=.77; post-manipulation r_{sb}=.81), and active harm (pre-manipulation ω=.88, 95% BCa CI [.72, .94]; post-manipulation ω=.9, 95% BCa CI [.71, .97]). Reliability was inadequate within this study for passive harm (pre-manipulation r_{sb}=.58; post-manipulation r_{sb}=.69). As the passive harm subscale contains two items, I did not run a PAFA for this subscale, and I was unable to remove an item to improve reliability. Instead, I retained both items in the subscale, and findings using this subscale should be interpreted with caution due to inadequate reliability.

3.2.3.6. Dissonance (Harmon-Jones, 2000).

Dissonance was measured via the Dissonance Affect Questionnaire (negative affect subscale; Harmon-Jones, 2000), whereby participants rated, on a Likert scale from one ('*not at all*') to five ('*extremely*'), how *'uncomfortable'*, *'uneasy'*, and '*bothered*' they currently felt (α=.7 from Harmon-Jones, 2000). No items were reverse-scored. Items were summed to provide a dissonance score. A higher score indicates greater dissonance. Reliability was adequate within this study: post-manipulation (ω=.97, 95% BCa CI [.95, .98]), post-evaluation (ω=.95, 95% BCa CI [.93, .97]). Dissonance was measured twice within this study: once following the behavioural and subjective self-relevance manipulation (post-manipulation), and once following warmth, competence, and behavioural intentions ratings (post-evaluation).

3.2.3.7. Reported Weekly Meat Consumption.

Reported weekly meat consumption was measured through the single item '*How many days a week do you consume meat?',* from zero to seven days per week.

3.2.4. Procedure

Participants were recruited via social media, posters/flyers, and Sona (Appendix 5). The experiment was conducted in April and May 2020 as a voluntary, open survey. After providing informed consent, participants were asked if they recognised tree kangaroos (alongside a photograph of the animal), followed by a fossa and tamandua if participants recognised any previous animal. Animal species names were used throughout the study. The experiment either proceeded using the unrecognised animal as the target animal, or, if participants recognised all three animals, they were redirected towards the end of the experiment and did not participate further. Following initial recognition stage, participants rated the target animal's warmth and competence, alongside behavioural intentions towards the animal (all scales and items within scales presented in randomised order).

After initial ratings, participants were randomly assigned to read one of the four behavioural and subjective self-relevance text manipulations described in Section 3.2.3.3. regarding their target animal. Participants subsequently indicated their dissonance and reported weekly meat consumption. Participants then again gave their warmth, competence, and behavioural intentions ratings (all scales and items within scales presented in randomised order), followed by re-stating their current dissonance. Participants completed the attention check '*Please choose 3 somewhat*' in the post-manipulation warmth and competence subscales. Eighteen participants were excluded for failing this attention check. Finally, participants provided demographics before being debriefed. One participant was excluded based on technical difficulties due to stating the animal photograph did not load. An additional six participants reported technical difficulties, but responses were complete and maintained within analyses. ARU undergraduate psychology students (*n*=13) received 0.25 Sona credits as reimbursement. All other participants could enter a prize draw to win one of two £50 Amazon gift vouchers if they wished.

3.3. Analyses

A 2(behavioural self-relevance: present vs. absent) x 2(subjective self-relevance: present vs. absent) x 2(time: pre- vs. post-manipulation) mixed MANCOVA was conducted with warmth, competence, active help, passive help, active harm, and passive harm as the DVs. As all of the DVs were conceptually related (from the SCM/BIAS map and subscales of the same overall scales), alongside many DVs being statistically related through moderate correlations, *r*s ≥ .3, MANCOVA was deemed appropriate for this analysis. An additional 2(behavioural self-relevance: present vs. absent) x 2(subjective self-relevance: present vs. absent) between-subjects MANCOVA was conducted on reported weekly meat consumption, post-manipulation dissonance, and post-evaluation dissonance as the DVs. As two of the DVs were conceptually related (i.e., post-manipulation dissonance and post-evaluation dissonance are the same variable measured at different timepoints), as well as some moderate correlations between the DVs, *r*s ≥ .3, MANCOVA was deemed appropriate for this analysis.

Gender and diet were again included as covariates within these MANCOVAs. Although the current study randomly allocates participants to conditions, and therefore diet and gender are approximately evenly balanced across conditions, inclusion of these covariates still increases power of the analyses by controlling for and partialling out any relationship between these covariates and the outcome variables (Tabachnick & Fidell, 2014). Therefore, as both diet and gender have previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007; Lund et al., 2016; Rothgerber, 2015), including diet and gender as covariates allows for any theoretically-informed relationships between diet and gender, and warmth/competence perceptions of dogs and pigs and behavioural intentions towards them (the outcome variables) to be statistically controlled for.

3.3.1. Statistical Assumptions to Test H1-H4: Exploring Effects of Behavioural and Subjective Self-Relevance on SCM and BIAS Map DVs (2x2x2 MANCOVA)

Most DVs, except for pre-manipulation competence when both behavioural and subjective self-relevance were present, failed normality tests, ps < .05. However, most DVs had acceptable skewness, except for active harm across conditions and passive harm in all post-manipulation conditions except when behavioural and subjective self-relevance were both present. Due to excessive skewness, multiple extreme univariate outliers, and floor effects in active harm and passive harm, I also ran a MANCOVA excluding active harm and passive harm as DVs, which did not change multivariate conclusions. I therefore report the MANCOVA including active harm and passive harm.

All DVs except active harm and passive harm had non-extreme univariate outliers in at least one condition, which did not cause excessive skewness. There were multivariate outliers for six DVs, critical values ≥ 22.46, $p < .001$. Running the MANCOVA including and excluding univariate and multivariate outliers was not possible due to floor effects in active harm and passive harm. However, running the MANCOVA including and excluding univariate and multivariate outliers without active harm and passive harm as DVs indicated multivariate conclusions did not change, and I therefore report the MANCOVA including univariate and multivariate outliers.

There was no multicollinearity, *r*s $\leq .73$. Linear relationships were mostly present. Running follow-up univariate ANCOVAs including and excluding univariate outliers did not change conclusions for active help and warmth, whilst one minor finding was changed for competence (Footnote 10), and for passive help (Footnote 11). I report these ANCOVAs including outliers to reflect the unamended dataset. Excessive skewness, multiple univariate outliers, and floor effects in active harm and passive harm meant assumptions for the ANCOVAs on these two DVs were violated. However, I proceeded with these ANCOVAs due to robustness of ANCOVA to non-normality and lack of non-parametric alternatives. Results from these ANCOVAs should be interpreted with caution.

Homogeneity of variances was present for all DVs, *p*s > .05, except active harm and passive harm, *p*s < .05. Homogeneity of covariances was not present, $p < .001$.

3.3.2. Statistical Assumptions to Test H5 and Exploratory Analysis: Exploring Effects of Behavioural and Subjective Self-Relevance on Post-Manipulation Dissonance, Post-Evaluation Dissonance and Reported Weekly Meat Consumption (2x2 MANCOVA)

All DVs failed normality tests, *p*s < .05, but all DVs had acceptable skewness. Post-manipulation dissonance and reported weekly meat consumption did not have univariate outliers, whilst post-evaluation dissonance did have univariate outliers. However, these univariate outliers were not extreme, and they did not excessively skew post-evaluation dissonance. There were no multivariate outliers for three DVs, critical values < 16.27, $p > .001$. Running the MANCOVA including and excluding univariate outliers did not change conclusions. I therefore report this analysis including univariate outliers.

There was no multicollinearity, *r*s $\leq .54$. Linear relationships between the DVs were not present across each condition. Running follow-up univariate ANCOVAs including and excluding univariate outliers for post-evaluation dissonance did not change conclusions. I therefore report this ANCOVA including univariate outliers. Homogeneity of variances was present for all DVs, ps > .05. Homogeneity of covariances was present, $p > .001$.

3.3.3. Testing H1-H4: Exploring Effects of Behavioural and Subjective Self-Relevance on SCM and BIAS Map DVs

A 2(behavioural self-relevance: present vs. absent; between-subjects) x 2(subjective self-relevance: present vs. absent; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed MANCOVA, including diet and gender as covariates, was run on warmth, competence, active help, passive help, active harm, and passive harm to test **H1-H4** (see Table A2 in Appendix 4 for full inferential statistics). To be deemed to have a causal effect in line with **H1-H4**, behavioural self-relevance and subjective self-relevance must interact with time on the combined DVs, as significant main effects of behavioural and/or subjective self-relevance without interacting with time indicate a randomly occurring difference between groups even before reading the self-relevance manipulations.

3.3.3.1. Multivariate Effects of Behavioural and Subjective Self-Relevance on the Combined DVs.

Not supporting hypotheses (**H1-H4**), neither behavioural self-relevance, $F(6, 216) = .76$, $p = .6$, $\eta_p^2 = .02$, nor subjective self-relevance, $F(6, 216) = 1.08$, $p = .38$, $\eta_p^2 = .03$, significantly interacted with time to have an effect on the combined DVs. As a result, inferential and descriptive statistics for follow-up ANCOVAs on the separate DVs with behavioural and subjective self-relevance as IVs are not reported. However, there were significant main effects of diet, $F(6, 216) = 2.36$, $p = .03$, $\eta_p^2 = .06$ (medium-sized), gender, $F(6, 216) = 3.31$, $p = .004$, $\eta_p^2 = .08$ (medium-sized), and time, $F(6, 216) = 2.71$, $p = .02$, $\eta_p^2 = .07$ (medium-sized), on the combined DVs. I followed up these significant multivariate effects with univariate ANCOVAs on the DVs separately. As these findings relate only to covariates and to time (rather than the primary variables of behavioural and subjective self-relevance), only significant univariate findings regarding these variables are reported below.

3.3.3.2. Univariate Effect of Time on Warmth.

There was a significant main effect of time on warmth, $F(1, 221) = 9.91$, $p = .002$, $\eta_p^2 = .04$ (small-sized), whereby the animal was deemed significantly warmer post-manipulation (M=10.35, SD=2.64) than pre-manipulation (M=9.97, SD=2.45).

3.3.3.3. Univariate Effects of Diet and Gender on Competence.[10]

There were significant main effects of gender, $F(1, 221) = 6.55$, $p = .01$, $\eta_p^2 = .03$ (small-sized), and diet, $F(1, 221) = 5.16$, $p = .02$, $\eta_p^2 = .02$ (small-sized), on competence, whereby women viewed animals as significantly more competent than men did pre-manipulation, $B = -.99$, $SE = .37$, $p = .01$, and post-manipulation, $B = -.8$, $SE = .37$, $p = .03$, and non-meat consumers viewed animals as significantly more competent than meat consumers did pre-manipulation, $B = -.74$, $SE = .34$, $p = .03$, and post-manipulation, $B = -.73$, $SE = .34$, $p = .03$.

3.3.3.4. Univariate Effects of Time and Diet on Active Help.

Time had a significant effect on active help, $F(1, 221) = 5.43$, $p = .02$, $\eta_p^2 = .02$ (small-sized), whereby active help increased from pre-manipulation (M=15.88, SD=3.38) to post-manipulation (M=16.16, SD=3.31). There was also a significant main effect of diet on active help, $F(1, 221) = 7.75$, $p = .01$, $\eta_p^2 = .03$ (small-sized), whereby non-meat consumers showed significantly greater active help than meat consumers, pre-manipulation, $B = -1.14$, $SE = .49$, $p = .02$, and post-manipulation, $B = -1.4$, $SE = .47$, $p = .003$.

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[10] When excluding univariate outliers, the main effect of diet on competence was no longer significant, $F(1, 217) = 3.57$, $p = .06$, $\eta_p^2 = .02$ (small-sized). Additionally, diet still had a significant effect pre-manipulation, $B = -.64$, $SE = .32$, $p = .0497$, but no longer had a significant effect post-manipulation, $B = -.53$, $SE = .32$, $p = .1$.

3.3.3.5. Univariate Effect of Diet on Passive Help.[11]

There was a significant main effect of diet on passive help, $F(1, 221) = 9.99$, $p = .002$, $\eta_p^2 = .04$ (small-sized), whereby non-meat consumers showed significantly greater passive help than meat consumers, pre-manipulation, $B = -.65$, $SE = .25$, $p = .01$, and post-manipulation, $B = -.87$, $SE = .26$, $p = .001$.

3.3.3.6. Univariate Effect of Gender on Active Harm.

There was a significant main effect of gender on active harm, $F(1, 221) = 8.91$, $p = .003$, $\eta_p^2 = .04$ (small-sized), whereby men were significantly more willing to actively harm animals than women were pre-manipulation, $B = .88$, $SE = .31$, $p = .01$, and post-manipulation, $B = .84$, $SE = .29$, $p = .004$.

3.3.3.7. Univariate Effect of Time on Passive Harm.

There was a significant main effect of time on passive harm, $F(1, 221) = 4.07$, $p = .045$, $\eta_p^2 = .02$ (small-sized), whereby passive harm decreased from pre-manipulation (M=2.8, SD=1.15) to post-manipulation (M=2.63, SD=1.17).

3.3.4. Testing H5 and Exploratory Analysis: Exploring Effects of Behavioural and Subjective Self-Relevance on Post-Manipulation Dissonance, Post-Evaluation Dissonance and Reported Weekly Meat Consumption

A 2(behavioural self-relevance: present vs. absent) x 2(subjective self-relevance: present vs. absent) between-subjects MANCOVA, including diet and gender as covariates, was run on post-manipulation dissonance (to test **H5**), post-evaluation dissonance, and reported weekly meat consumption (see Table A3 in Appendix 4 for full inferential statistics).

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[11] When excluding univariate outliers, a main effect of time on passive help became significant, $F(1, 214) = 5.96$, $p = .02$, $\eta_p^2 = .03$ (small-sized). Specifically, participants were significantly more willing to passively help the animal post-manipulation (M=8.4, SD=1.66) than pre-manipulation (M=8.29, SD=1.65).

Descriptive statistics for effects of behavioural and subjective self-relevance are reported in Tables 3 and 4 respectively.

3.3.4.1. Multivariate Effects of Behavioural and Subjective Self-Relevance on Combined DVs.

Behavioural self-relevance, $F(3, 219) = 4.47$, $p = .01$, $\eta_p^2 = .06$ (medium-sized), and subjective self-relevance, $F(3, 219) = 5.29$, $p = .002$, $\eta_p^2 = .07$ (medium-sized), had significant main effects on the combined DVs. Diet, $F(3, 219) = 88.16$, $p < .001$, $\eta_p^2 = .55$ (large-sized), and gender, $F(3, 219) = 2.91$, $p = .04$, $\eta_p^2 = .04$ (small-sized), also had significant main effects on the combined DVs. I followed up these significant multivariate effects with univariate ANCOVAs on the DVs below.

3.3.4.2. H5: Univariate Effects of Behavioural and Subjective Self-Relevance on Post-Manipulation Dissonance.

Supporting H5: Behavioural self-relevance had a significant effect on post-manipulation dissonance, $F(1, 221) = 12.51$, $p < .001$, $\eta_p^2 = .05$ (small-to-medium-sized), whereby participants reported greater post-manipulation dissonance when behavioural self-relevance was present than when behavioural self-relevance was absent. That is, participants felt greater discomfort when asked to imagine agreeing to consume the meat than when asked to imagine refusing to consume the meat. **Yet contradicting H5:** Subjective self-relevance had a significant effect on post-manipulation dissonance, $F(1, 221) = 9.01$, $p = .003$, $\eta_p^2 = .04$ (small-sized), in the opposite direction to predicted**.** Specifically, participants reported greater dissonance when subjective self-relevance was absent than when subjective self-relevance was present. That is, participants felt greater discomfort when asked to imagine disliking the meat than when asked to imagine liking the meat. There were also significant main effects of gender, $F(1, 221) = 5.29$, $p = .02$, $\eta_p^2 = .02$ (small-sized), and diet, $F(1, 221) = 10.73$, $p = .001$, $\eta_p^2 = .05$ (small-to-medium-sized), on post-manipulation dissonance, whereby women, *B* = -1.42, *SE* = .62, and non-meat consumers, *B* = -1.88, *SE* = .57, experienced significantly greater post-manipulation dissonance than men and meat consumers respectively.

3.3.4.3. Univariate Effects of Behavioural and Subjective Self-Relevance on Post-Evaluation Dissonance.

Neither behavioural self-relevance, $F(1, 221) = .78$, $p = .38$, $\eta_p^2 = .004$, nor subjective self-relevance, $F(1, 221) = .83$, $p = .36$, $\eta_p^2 = .004$, had a significant effect on post-evaluation dissonance.

3.3.4.4. Univariate Effects of Behavioural and Subjective Self-Relevance on Reported Weekly Meat Consumption.

Neither behavioural self-relevance, $F(1, 221) = .3$, $p = .58$, $\eta_p^2 = .001$, nor subjective self-relevance, $F(1, 221) = 1.21$, $p = .27$, $\eta_p^2 = .01$, had a significant effect on reported weekly meat consumption. There was therefore no evidence for under-reporting across behavioural and subjective self-relevance conditions. There was a significant effect of diet on reported weekly meat consumption, $F(1, 221) = 257.58$, $p < .001$, $\eta_p^2 = .54$ (large-sized), whereby, unsurprisingly, meat consumers (vs. non-meat consumers) reported greater weekly meat consumption, *B* = 4.19, *SE* = .26.

Table 3.
Descriptive Statistics for Effect of Behavioural Self-Relevance on Post-Manipulation Dissonance, Post-Evaluation Dissonance, and Reported Weekly Meat Consumption.

DV	Present Mean	Present *SD*	Absent Mean	Absent *SD*
Post-Manipulation Dissonance**	10.63	4.18	8.78	4.08
Post-Evaluation Dissonance	6.28	3.33	5.91	3.46
Reported Weekly Meat Consumption	3.59	2.7	3.39	2.6

Note: Present refers to behavioural self-relevance being present, whilst absent refers to behavioural self-relevance being absent. **p*<.05, ***p*≤.01, ****p*≤.001

Table 4.

Descriptive Statistics for Effect of Subjective Self-Relevance on Post-Manipulation Dissonance, Post-Evaluation Dissonance, and Reported Weekly Meat Consumption.

DV	Present Mean	Present *SD*	Absent Mean	Absent *SD*
Post-Manipulation Dissonance***	9.04	4.18	10.26	4.19
Post-Evaluation Dissonance	6.34	3.41	5.85	3.38
Reported Weekly Meat Consumption	3.4	2.76	3.56	2.53

Note: Present refers to subjective self-relevance being present, whilst absent refers to subjective self-relevance being absent. *$p<.05$, **$p\leq.01$, ***$p\leq.001$

3.3.5. Testing H6-H9: Exploring Mediational Relationships Between Behavioural and Subjective Self-Relevance, Dissonance, Warmth and Active Behavioural Intentions

Per motivated cognition theory, I hypothesised post-manipulation dissonance would mediate the relationship between behavioural (**a**) and subjective self-relevance (**b**) and post-manipulation warmth (**H6**), and that post-manipulation warmth would mediate the relationship between post-manipulation dissonance and post-evaluation dissonance (**H7**). Per the BIAS map, I predicted post-manipulation warmth would mediate a) the relationship between behavioural self-relevance and post-manipulation active harm and post-manipulation active help (**H8**), and b) the relationship between subjective self-relevance and post-manipulation active harm and post-manipulation active help (**H9**).

To test **H6** and **H8-H9**, I dummy coded behavioural self-relevance and subjective self-relevance into two dummy variables. That is, behavioural self-relevance was coded as absence (zero) and presence of behavioural self-relevance (one), whilst subjective self-relevance was coded as absence (zero) and presence of subjective self-relevance (one). Seven individual bootstrapped mediation analyses (10,000 bootstrapped samples) were run using Model 4 in PROCESS through SPSS (Hayes, 2022).[12] To control for Type I error from

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[12] The causal steps approach (Baron & Kenny, 1986) is not utilised for any mediation analyses throughout this thesis due to multiple criticisms of this approach (Hayes, 2009; Pardo & Román, 2013; Zhao et al., 2010).

multiple mediation testing, I utilised an adjusted confidence interval of 99%. Significant mediations are interpreted through confidence intervals which do not contain zero per Hayes (2018).

Note that competence was not included in mediational hypotheses, as Study 1 found that behavioural and subjective self-relevance were associated only with warmth, and not with competence. Additionally, passive behavioural intentions were not included within mediational hypotheses or analyses, as passive behavioural intentions are usually linked to competence rather than warmth, and warmth does not always inform passive behavioural intentions (Sevillano & Fiske, 2016b). However, as post-manipulation warmth and post-manipulation competence were significantly correlated with each other within the current study as revealed through a Pearson correlation, $r = .37$, $p < .001$, and warmth and competence are conceptually related, post-manipulation competence was included as a parallel mediator within mediation analyses below which included post-manipulation warmth as a mediator (i.e., **H7**-**H9**). Inclusion of competence as a parallel mediator alongside warmth allows for testing of any mediational roles of warmth *whilst* controlling for competence (Hayes, 2018).

3.3.5.1. H6a: Mediation of Behavioural Self-Relevance on Post-Manipulation Warmth through Post-Manipulation Dissonance.

Not supporting H6a: There was no significant indirect effect of behavioural self-relevance on post-manipulation warmth through post-manipulation dissonance, $b = .16$, $SE = .1$, 99% CI [-.06, .5]. Thus, post-manipulation dissonance did not significantly mediate the relationship between behavioural self-relevance and post-manipulation warmth.

3.3.5.2. H6b: Mediation of Subjective Self-Relevance on Post-Manipulation Warmth through Post-Manipulation Dissonance.

Not supporting H6b: There was no significant indirect effect of subjective self-relevance on post-manipulation warmth through post-manipulation dissonance, $b = -.09$, $SE = .07$, 99% CI [-.34, .07]. Thus, post-manipulation dissonance did not significantly mediate the relationship between subjective self-relevance and post-manipulation warmth.

3.3.5.3. H7: Mediation of Post-Manipulation Dissonance on Post-Evaluation Dissonance through Post-Manipulation Warmth.

Not supporting H7: There was no significant indirect effect of post-manipulation dissonance on post-evaluation dissonance through post-manipulation warmth when controlling for post-manipulation competence, $b = -.004$, $SE = .01$, 99% CI [-.04, .03].[13] Therefore, post-manipulation warmth did not significantly mediate the relationship between post-manipulation dissonance and post-evaluation dissonance.

3.3.5.4. H8a: Mediation of Behavioural Self-Relevance on Post-Manipulation Active Harm through Post-Manipulation Warmth.

Not supporting H8a: There was no significant indirect effect of behavioural self-relevance on post-manipulation active harm through post-manipulation warmth when controlling for post-manipulation competence, $b = .003$, $SE = .03$, 99% CI [-.08, .1]. Therefore, post-manipulation warmth did not significantly mediate the relationship between behavioural self-relevance and post-manipulation active harm. Additionally, inspection of path *b* indicated post-manipulation warmth did not significantly predict active harm, $b = -.07$, $SE = .05$, $p = .19$, 99% CI [-.2, .07].

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[13] The figures reported for the mediation analysis assessing if warmth mediates the relationship between post-manipulation dissonance and post-evaluation dissonance are fully standardised, as all variables within this mediation analysis are continuous. All other mediation analyses within this study, and throughout the rest of this thesis, are reported with non-standardised figures due to the inclusion of nominal IVs (Hayes, 2018).

3.3.5.5. H8b: Mediation of Behavioural Self-Relevance on Post-Manipulation Active Help through Post-Manipulation Warmth.

Not supporting H8b: There was no significant indirect effect of behavioural self-relevance on post-manipulation active help through post-manipulation warmth when controlling for post-manipulation competence, $b = -.03$, $SE = .24$, 99% CI [-.66, .59]. Therefore, post-manipulation warmth did not significantly mediate the relationship between behavioural self-relevance and post-manipulation active help. Despite lack of mediation, inspection of path *b* indicated greater post-manipulation warmth significantly predicted greater post-manipulation active help, $b = .67$, $SE = .07$, $p < .001$, 99% CI [.49, .85].

3.3.5.6. H9a: Mediation of Subjective Self-Relevance on Post-Manipulation Active Harm through Post-Manipulation Warmth.

Not supporting H9a: There was no significant indirect effect of subjective self-relevance on post-manipulation active harm through post-manipulation warmth when controlling for post-manipulation competence, $b = .05$, $SE = .04$, 99% CI [-.03, .21]. Therefore, post-manipulation warmth did not significantly mediate the relationship between subjective self-relevance and post-manipulation active harm. Additionally, inspection of path *b* indicated post-manipulation warmth did not significantly predict post-manipulation active harm, $b = -.08$, $SE = .05$, $p = .14$, 99% CI [-.21, .06].

3.3.5.7. H9b: Mediation of Subjective Self-Relevance on Post-Manipulation Active Help through Post-Manipulation Warmth .

Not supporting H9b: There was no significant indirect effect of subjective self-relevance on post-manipulation active help through post-manipulation warmth when controlling for post-manipulation competence, $b = -.46$, $SE = .24$, 99% CI [-1.12, .17]. Therefore, post-manipulation warmth did not significantly mediate the relationship between subjective self-relevance and post-manipulation active help. Despite lack of mediation, inspection of path *b* indicated greater post-manipulation warmth significantly predicted greater post-manipulation active help, $b = .68$, $SE = .07$, $p < .001$, 99% CI [.5, .86].

3.4. Discussion

3.4.1. Discussion of Findings

3.4.1.1. H1-H5: Effects of Behavioural and Subjective Self-Relevance on Warmth, Active Harm, Active Help and Post-Manipulation Dissonance.

Neither behavioural nor subjective self-relevance had a multivariate effect on the combined DVs. Whilst effects of behavioural or subjective self-relevance on competence, passive help, and passive harm were not hypothesised, these null findings may not support **H1** and **H2a/b** for warmth, **H3a** and **H4a** for active harm, and **H3b** and **H4b** for active help. That is, the null findings may not support hypotheses whereby subjectively self-relevant animals (vs. not) were expected to be deemed less warm (**H1**), and subject to greater active harm (**H3a**) and less active help (**H3b**), whilst behaviourally self-relevant animals (vs. not) were expected to be deemed less (**H2a**) or more warm (**H2b**), and, if deemed less warm, subject to greater active harm (**H4a**) and less active help (**H4b**). These null findings may therefore not support previous literature (Loughnan et al., 2010; Piazza & Loughnan, 2016), and may not align with Study 1 findings regarding the relationships between behavioural and subjective self-relevance and warmth. Overall, the null findings regarding behavioural and subjective self-relevance may arise from lack of effectiveness of the text manipulations in manipulating behavioural or subjective self-relevance. That is, the texts may have failed to affect perceptions of animals or behavioural intentions towards them due to an inability of the texts to elicit behavioural and subjective self-relevance. I therefore conducted a follow-up study to test effectiveness of the current self-relevance texts in manipulating behavioural and subjective self-relevance (Section 4.2.).

Partially supporting **H5**, and aligning with motivated cognition literature (Loughnan et al., 2010, 2014; Piazza & Loughnan, 2016), behavioural self-relevance (vs. none) increased post-manipulation dissonance (small-to-medium-sized). That is, imagining agreeing to consume the meat caused greater discomfort than imagining refusing to consume the meat. However, partly not supporting **H5** and this previous literature, subjective self-relevance (vs. none) decreased post-manipulation dissonance (small-sized) and was thus in the opposite direction to predicted. That is, imagining disliking the meat caused more discomfort than imagining liking the meat. This finding may have arisen from the dissonance scale measuring general discomfort instead of actual dissonance. That is, the scenario may have elicited discomfort due to participants imagining disliking a food they had just imagined consuming (Section 3.4.2. provides further discussion). The subjective self-relevance effect on post-manipulation dissonance was small-sized only, so may have lower practical significance.

3.4.1.2. H6-H9: Mediational Relationships Between Behavioural and Subjective Self-Relevance, Dissonance, Warmth and Active Behavioural Intentions.

Findings may not support the mediational hypotheses (**H6-H9**). That is, post-manipulation dissonance did not mediate relationships between behavioural self-relevance and post-manipulation warmth, nor between subjective self-relevance and post-manipulation warmth (**H6**). Post-manipulation warmth did not mediate the relationship between post-manipulation dissonance and post-evaluation dissonance (**H7**). Post-manipulation warmth did not mediate relationships between behavioural self-relevance and post-manipulation active help, nor between behavioural self-relevance and post-manipulation active harm (**H8**). Finally, post-manipulation warmth did not mediate relationships between subjective self-relevance and post-manipulation active help, nor between subjective self-relevance and post-manipulation active harm (**H9**). Lack of support for **H8** and **H9** may reflect broader non-significant effects of behavioural and subjective self-relevance on perceptions of animals and behavioural intentions towards them (e.g., as identified within the main MANCOVA). Meanwhile, lack of support for **H6** and **H7** may indicate that motivated cognition is not evidenced. Specifically, lack of support for **H6** may indicate that dissonance does not motivate reduced perceptions of animals' warmth after behavioural and subjective self-relevance are elicited. Furthermore, lack of support for **H7** may indicate people do not intentionally dehumanise animals following behavioural and subjective self-relevance by decreasing the animals' warmth to alleviate dissonance. These findings may not support previous literature regarding the 'meat paradox' and motivated cognition (Bilewicz et al., 2011; Piazza & Loughnan, 2016). Combined with null effects of behavioural and subjective self-relevance on all SCM/BIAS map DVs, and equivocal effects of behavioural and subjective self-relevance on dissonance, these findings may not support motivated cognition theory as applied to animals (Piazza & Loughnan, 2016). However, it is unclear if motivated cognition is genuinely not evidenced or whether motivated cognition could not be effectively tested here due to limitations with the behavioural and subjective self-relevance manipulations and measures used (e.g., for dissonance; Section 3.4.2.).

3.4.1.3. Exploring Associations Between Warmth and Active Behavioural Intentions.

Despite lack of significant mediations, greater warmth was associated with greater active help within the behavioural and subjective self-relevance mediation analyses, aligning with the BIAS map (Sevillano & Fiske, 2016b). However, not supporting the BIAS map, warmth was not associated with active harm within either the behavioural or subjective self-relevance mediation analyses. Whilst the consistent relationship between warmth and active help supports the BIAS map, the lack of relationship between warmth and active harm may indicate active harm is not always informed by warmth. This finding is surprising based on previous literature exploring the SCM/BIAS map with animals, which has consistently found negative effects of warmth on active harm (Sevillano & Fiske, 2016b, 2019).

3.4.1.4. Unexpected Effects of Time on Warmth, Active Help, and Passive Harm.

There were unexpected effects of time on warmth, active help, and passive harm (small-sized). Specifically, regardless of the content of the text read by participants (e.g., behavioural and subjective self-relevance), simply reading about the animal increased warmth and active help, and decreased passive harm, towards the animal from pre- to post-manipulation. Thus, this finding indicates reading information even about imagining consuming an animal may counterintuitively improve the animal's warmth, increase active help, and decrease passive harm towards the animal. This finding therefore stands in contrast to extensive previous literature finding that people struggle with the 'meat paradox', whereby they use various strategies to avoid thinking about the harm they cause to animals they consume (see Gradidge et al., 2021a), and that reminders of this harm (e.g., consumption) elicit moral disengagement from animals (Graça et al., 2014). Instead, these findings indicate reading about the scenario, regardless of behavioural or subjective self-relevance, elicited moral engagement in warmth and active help, and a reduction in passive harm. Furthermore, passive harm may have reduced due to the nature of the passive harm items, whereby participants were less able to '*ignore*' the animal after reading the manipulation. These findings are small-sized only, so may have lower practical significance. Additionally, the effect on passive harm should be interpreted with caution due to inadequate scale reliability.

3.4.1.5. Effects of Behavioural and Subjective Self-Relevance on Reported Meat Consumption.

Neither behavioural self-relevance nor subjective self-relevance had effects on reported meat consumption. Thus, neither behavioural self-relevance nor subjective self-relevance caused under-reporting of meat consumption. This finding does not, however, elucidate if there was under-reporting present across all conditions (e.g., Rothgerber, 2019).

3.4.2. Limitations of the Current Study and Directions for Future Research

The current study has some limitations, which are addressed in subsequent pilot studies (Pilot Studies 1a, 2a, 3a, 4a; Sections 4.2. to 4.5.) and/or Study 3: a) lack of manipulation checks, b) possible measurement of general discomfort instead of dissonance, and c) possible elicitation of food neophobia.

Firstly, the current study assumed effectiveness of the texts in manipulating behavioural self-relevance and subjective self-relevance, instead of testing this effectiveness explicitly. Thus, null effects on most DVs may arise from a lack of effectiveness of the behavioural and subjective self-relevance manipulations rather than from genuine lack of effects of behavioural and subjective self-relevance. Therefore, to test this possible explanation, a follow-up study (Section 4.2.) aims to test if the behavioural and subjective self-relevance text manipulations used within the current study fail to effectively manipulate behavioural and subjective self-relevance.

Secondly, the dissonance scale may have measured general discomfort instead of dissonance. For example, the scale constitutes the items *'uncomfortable'*, *'uneasy'*, and '*bothered'*, and so theoretically could have measured participants' (non-dissonance-related) discomfort, possibly explaining why the main effect of subjective self-relevance on post-manipulation dissonance was in the opposite direction to predicted. That is, imagining disliking the meat may have caused greater post-manipulation dissonance simply because imagining consuming a food they dislike was uncomfortable for participants. Thus, the dissonance measure may have been measuring broader general discomfort instead of moral discomfort. Whilst the Dissonance Affect Questionnaire was again included in Study 3 to maintain consistency across studies, the variable of ‘dissonance’ is hereby renamed discomfort to reflect the questionnaire’s possible measurement of discomfort instead of dissonance.

Thirdly, related to the above limitations, the current behavioural and subjective self-relevance manipulation may have elicited *food neophobia* (anxiety and hesitancy about consuming new foods; Damsbo-Svendsen et al., 2017), which applies especially to novel types of meat (Çınar et al., 2021). Thus, the manipulation, especially within the behavioural self-relevance and lack of subjective self-relevance condition (imagining consuming and disliking the meat), may have inadvertently reduced willingness to imagine the situation due to a reluctance to engage with novel meats. To better address this limitation, I implement an alternative behavioural self-relevance manipulation in Study 3 (piloted in Pilot Studies 1a, 2a, 3a, 4a, Sections 4.2. to 4.5.) using the common dish of spaghetti bolognese instead of meat specifically, which may reduce food neophobia, as food neophobia is especially sensitive to novel meats.

3.4.3. Conclusion

Overall, the current experiment indicates behavioural and subjective self-relevance may not affect an animal’s warmth and competence nor behavioural intentions towards the animal. Therefore, a follow-up study will be conducted (Follow-Up/Pilot Study 1; Section 4.2.) to test if the behavioural and subjective self-relevance manipulations utilised within the current study are failing to manipulate behavioural and subjective self-relevance. If so, this failure in the manipulations may explain the null results, as opposed to non-significant effects of behavioural and subjective self-relevance themselves.

Regarding the mediation analyses findings, although greater warmth was consistently associated with greater active help in mediation analyses, warmth was not associated with active harm. Thus, the current experiment provides some support for the BIAS map, but also indicates warmth and active harm may be more separable than originally theorised. That is, unlike what would be expected following previous SCM/BIAS map research with animals (Sevillano & Fiske, 2016b), greater warmth may not always link to decreased active harm.

Additionally, whilst behavioural self-relevance did increase post-manipulation dissonance like originally hypothesised, the experiment does not provide support for the full motivated cognition theory. Furthermore, subjective self-relevance had the opposite effect to behavioural self-relevance on post-manipulation dissonance, whereby imagining disliking the meat caused greater dissonance, indicating either that behavioural and subjective self-relevance have differential, opposite effects, or that the dissonance scale used here has limitations (e.g., by measuring general discomfort instead of dissonance). There was no evidence for under-reporting of meat consumption within any specific behavioural or subjective self-relevance condition.

Overall, the current experiment indicates behavioural and subjective self-relevance, at least as manipulated here, may not inform peoples' perceptions of animals (warmth, competence), nor behavioural intentions towards them (active help, passive help, active harm, passive harm). The current study has limitations regarding lack of manipulation checks, the dissonance measure, and possible elicitation of food neophobia. Follow-Up/Pilot Study 1 (Section 4.2.) therefore acts as a follow-up to the current study by testing if the behavioural and subjective self-relevance manipulations used within the current study fail to effectively manipulate behavioural and subjective self-relevance, and whether this possible failed manipulation therefore explains the current study's null results.

Chapter 4. Pilot Studies and Study 3 Exploring Behavioural and Subjective Self-Relevance

4.1. Introduction

Following null effects of the behavioural and subjective self-relevance manipulations in Study 2, the current chapter presents four pilot studies (Pilot Studies 1a, 2a, 3a, 4a) to a) test if these null effects may be arising from ineffectiveness of the original behavioural and subjective self-relevance texts in manipulating behavioural and subjective self-relevance (Follow-Up/Pilot Study 1a) and b) develop and pilot alternative behavioural and subjective self-relevance manipulations which do successfully manipulate behavioural and subjective self-relevance (Pilot Studies 2a, 3a, 4a). An alternative and successfully piloted behavioural and subjective self-relevance manipulation is then implemented within Study 3 in this chapter, to again test if behavioural and subjective self-relevance are causes of pet speciesism. These studies are now reported in turn below.

4.2. Follow-Up/Pilot Study 1a to Test Behavioural and Subjective Self-Relevance Manipulations

4.2.1. Introduction and Extension from Study 2

As behavioural and subjective self-relevance manipulations revealed null effects on SCM/BIAS map variables in Study 2, the current pilot study (Pilot Study 1a) therefore aims to determine if these null effects may be arising from failure of the texts to manipulate behavioural and subjective self-relevance. That is, the current pilot study aims to test if the behavioural and subjective self-relevance manipulations used within Study 2 are (in)effective at manipulating their intended variables, whereby behavioural and subjective self-relevance are again manipulated through text manipulations regarding a ‘target animal’ previously unknown to the participant. Specifically, participants are presented with an imaginary scenario where they are offered meat from an unknown animal, and they are asked to imagine either that they like/dislike this meat (manipulation of subjective self-relevance) and that they agree/refuse to consume this meat (manipulation of behavioural self-relevance). To check effectiveness of the behavioural self-relevance manipulation (manipulation check), the item '*How many days a week would you be willing to eat products made from tree kangaroos/fossas/tamanduas?'* was included to measure behavioural self-relevance. To check effectiveness of the subjective self-relevance manipulation (manipulation check), the first two items from the Product Involvement Scale were included to measure subjective self-relevance. No hypotheses are made for this follow-up/pilot study, as this pilot study is instead exploratory to determine (in)effectiveness of the behavioural and subjective self-relevance manipulations.

Note that this pilot study utilises the same participant sample to also pilot text manipulations for familiarity, similarity, and pet status, but only information relevant to the behavioural and subjective self-relevance manipulations is reported within the current chapter (see Section 5.2. for pilot study information about the similarity and familiarity manipulations [Pilot Study 1b], and Section 7.2. for pilot study information about the pet status manipulation [Pilot Study 1c]).

4.2.2. Methods

4.2.2.1. Participants.

Sixty-eight participants were recruited via social media and Sona as a volunteer sample. Thirteen participants were excluded for providing partial data. As all participants stated they were either a man or woman, no participants had to be excluded to enable gender to be dummy coded for inclusion of gender as a covariate (see Section 4.2.3. for further discussion). Exclusions left a total sample size of 55 participants (81.8% women, 18.2% men; M_{age}=23.38, SD_{age}=5.68, age range: 18-48), which exceeds the recommend 12 participants per condition for pilot studies (Julious, 2005). Participants within each condition are shown in

Table 5. Demographics of the sample are reported as follows in percentages, with demographic categories which make up less than 2% of the sample being collapsed into 'other'. For dietary group: 69.1% (meat consumer), 12.7% (reducetarian), 7.3% (vegetarian), and 5.5% each (flexitarian, pescatarian). For nationality: 54.5% (British), 5.5% (Romanian), 3.6% each (German, Indian, Lithuanian, no response, Portuguese, Spanish), and 18.4% other. For ethnicity: 76.1% (White), 12.6% (Asian), 3.6% each (mixed, would rather not say), and 4.1% other. For country of residence (M_{duration}=17.91, SD_{duration}=10.12, range: 1-48 years): 81.8% (United Kingdom), 3.6% (Germany), and 14.6% other. For religion: 29.1% (atheism), 21.8% (Christianity), 18.2% (agnosticism), 14.5% (would rather not say), 5.5% (no response), 3.6% each (Buddhism, Islam), and 3.7% other.

Table 5.
Participants Within Each Condition for Pilot Study 1a.

Behavioural Self-Relevance Condition	Subjective Self-Relevance Condition	Number of Participants
Present	Present	14
Present	Absent	12
Absent	Present	15
Absent	Absent	14

4.2.2.2. Design.

The current follow-up/pilot study follows a 2(subjective self-relevance: present vs. absent) x 2(behavioural self-relevance: present vs. absent) between-subjects ANCOVA design, with measured behavioural and subjective self-relevance as the DVs. Behavioural and subjective self-relevance were included as DVs to test effectiveness of the manipulations. Gender was included as a covariate (see Section 4.2.3. for further discussion).

4.2.2.3. Materials.

4.2.2.3.1. Behavioural and Subjective Self-Relevance Manipulations.

Behavioural and subjective self-relevance were manipulated as in Study 2. That is, through an imagined scenario about the participant's target animal as follows: '*Imagine that* *you like/dislike tree kangaroo meat. You have been offered tree kangaroo meat again. Imagine you agree/refuse to consume the tree kangaroo meat.*'. Subjective self-relevance is manipulated through use of the word '*like*' (subjective self-relevance) or '*dislike*' (lack of subjective self-relevance). Behavioural self-relevance is manipulated through use of the word '*agree*' (behavioural self-relevance) or '*refuse*' (lack of behavioural self-relevance).

4.2.2.3.2. Measured Behavioural Self-Relevance.

Like Study 1, measured behavioural self-relevance was measured through a single item developed by the researcher '*How many days a week would you be willing to eat products made from tree kangaroos/fossas/tamanduas?* (0-7 days). A higher score indicates greater behavioural self-relevance.

4.2.2.3.3. Measured Subjective Self-Relevance (Jain & Srinivasan, 1990; Kim, 2006; Luna & Kim, 2009).

Like Study 1, measured subjective self-relevance was measured using an adapted version of the Product Involvement Scale (Jain & Srinivasan, 1990; Kim, 2006; Luna & Kim, 2009), whereby participants indicated their level of agreement with statements regarding products from the target animal on a Likert scale from one ('*strongly disagree*') to seven ('*strongly agree*'). This scale was adapted by a) utilising a Likert scale instead of a semantic differential to reduce cognitive effort and ease scale completion (Friborg et al., 2006), and b) referring to products from the target animal specifically. A sample item is '*I am very interested in products made from tree kangaroos/fossas/tamanduas*'. Due to inadequate loading and communality of the third item, alongside poor correlations with the first two items, found in Study 1, only the first two statements from the Product Involvement Scale were utilised within the current study to measure subjective self-relevance. Therefore, both items were summed to create a two-item subjective self-relevance index, with higher scores indicating greater subjective self-relevance of the target animal (i.e., greater involvement with products from the target animal). Neither item is reverse-scored. Reliability was inadequate within this study per the Spearman-Brown coefficient (r_{sb}=.68). As this scale only contains two items, I did not run a PAFA for this scale, and I was unable to remove an item to improve reliability. Instead, I retained both items in the scale, and findings using this scale should be interpreted with caution due to inadequate reliability.

4.2.2.3.4. Attention and Memory Checks.

Attention paid to and memory for the text manipulations was tested through five attention and memory check items developed by the researcher as follows: '*Was the text you just read descriptive text or did it ask you to imagine a scenario?*', '*What animal did the text refer to?*', '*Did the text ask you to imagine that you were or were not offered tree kangaroo/fossa/tamandua meat?*', '*Did the text that you just read ask you to imagine that you like or do not like tree kangaroo/fossa/tamandua meat?*', and '*Did the text that you just read ask you to imagine that you agreed or refused to consume tree kangaroo/fossa/tamandua meat again?*'. These checks aimed to test that participants paid attention to and remembered the texts. Correct answers for each item received a score of one, whilst incorrect answers for each item received a score of zero. All answers were then added together, for a highest possible score of five. Inspection of these checks revealed that the vast majority of the sample (>75%) had perfect scores, indicating sufficient attention and memory for these manipulations.

4.2.2.3.5. Vividness of the Self-Relevance Manipulation.

Perceived vividness of the imagined self-relevance manipulation was measured, as imagined scenarios which are viewed as more vivid have greater impacts on behavioural intentions (Husnu & Crisp, 2010). Vividness was measured through a six-item semantic differential vividness measure from Husnu and Crisp (2010; α=.94), whereby participants answer how much they perceive their imagined scenario as being '*faint vs. vivid*', '*fuzzy vs.*

clear', '*dim vs. bright*', '*vague vs. sharp*', '*dull vs. lively*', and '*simple vs. detailed*'. Reliability was adequate for this scale within this study, ω=.93. Therefore, items were summed together to create a total vividness score. Higher scores indicate greater vividness. No items are reverse-scored. The majority of the sample (>50%) perceived the self-relevance manipulations to be vivid.

4.2.2.3.6. Ease of Imaginability of the Self-Relevance Manipulation.

Perceived ease of imaginability of the imagined self-relevance manipulation was measured in order to ensure participants were able to imagine the scenarios without difficulty. Ease of imaginability was measured through a single item '*How easy or difficult was it for you to imagine the previous scenario in the text you have just read?*' on a -50 (extremely difficult) to 50 (extremely easy) visual analogue scale, informed by previous literature (e.g., Black & Barnes, 2020; Broemer & Diehl, 2004). A higher score indicates greater ease of imaginability. The majority of the sample (>50%) perceived the self-relevance manipulations to be easy to imagine.

4.2.2.4. Procedure.

Participants were recruited via social media and Sona. The experiment was conducted in September and October 2020 as a voluntary, open survey. After providing informed consent, participants were asked if they recognised tree kangaroos (alongside a photograph of the animal), followed by a fossa and tamandua if participants recognised any previous animal. Animal species names were used throughout the study. The study either proceeded using the unrecognised animal as the target animal, or, if participants recognised all three animals, they were redirected towards the end of the study and did not participate further.

Following initial recognition stage, participants completed the three sections (self-relevance, familiarity/similarity, and pet status) of the pilot study in a randomised order.

Here, only the self-relevance section is described (see Section 5.2. for description of the familiarity/similarity section, and Section 7.2. for description of the pet status section). For the self-relevance section, participants were randomly assigned to read one of the four behavioural and subjective self-relevance text manipulations described in Section 4.2.2.3.1. regarding their target animal. After reading their self-relevance text, participants answered the five attention and memory checks, indicated their perceived vividness and ease of imaginability of the imagined scenario, and then completed the measures for behavioural and subjective self-relevance (manipulation checks). Finally, participants provided demographics before being debriefed. One participant reported technical difficulties, but their response was complete and maintained within analyses.

4.2.3. Analyses

Two 2(subjective self-relevance: present vs. absent) x 2(behavioural self-relevance: present vs. absent) between-subjects ANCOVAs, including gender as a covariate, were conducted on measured behavioural and subjective self-relevance respectively, to test if the manipulations managed or failed to effectively manipulate behavioural and subjective self-relevance. Note that behavioural and subjective self-relevance were both included as IVs within these analyses, rather than separate one-way ANCOVAs (one each for subjective and behavioural self-relevance), to test for and therefore ensure that the behavioural and subjective self-relevance manipulations do not interact. Whilst the DVs should theoretically be conceptually related (i.e., different forms of self-relevance), they were not significantly correlated within the current study, $r = .13$, $p = .34$, and therefore separate ANCOVAs are conducted rather than a MANCOVA.

Gender was again included as a covariate within these ANCOVAs. Although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analyses by controlling for and partialling out any relationship between gender and the outcome variables (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and measured behavioural/subjective self-relevance (the outcome variables) to be statistically controlled for.

4.2.3.1. Statistical Assumptions for Manipulation Checks: Exploring Effects of Behavioural and Subjective Self-Relevance Manipulations on Measured Behavioural and Subjective Self-Relevance (2x2 ANCOVAs).

Both DVs failed normality tests across most conditions, *p*s < .05. Measured subjective self-relevance had acceptable skewness, whilst measured behavioural self-relevance only had acceptable skewness in the manipulation whereby behavioural self-relevance was absent and subjective self-relevance was present. Measured subjective self-relevance had non-extreme univariate outliers, but these did not cause excessive skewness. Running a follow-up univariate ANCOVA including and excluding univariate outliers for measured subjective self-relevance did change one major finding (Footnote 14). I report the measured subjective self-relevance ANCOVA including outliers to reflect the unamended dataset. Excessive skewness, multiple univariate outliers, and floor effects in measured behavioural self-relevance meant assumptions for the ANCOVA on this DV were violated. However, I proceeded with this ANCOVA due to robustness of ANCOVA to non-normality and lack of non-parametric alternatives. Results from this ANCOVA should be interpreted with caution. Homogeneity of variances was present for both DVs, *p*s > .05.

4.2.3.2. Manipulation Checks: Exploring Effects of Behavioural and Subjective Self-Relevance Manipulations on Measured Behavioural and Subjective Self-Relevance.

Two 2(behavioural self-relevance: present vs. absent) x 2(subjective self-relevance: present vs. absent) between-subjects ANCOVAs, including gender as a covariate, were run on measured behavioural and subjective self-relevance to test manipulation checks.

4.2.3.2.1. Univariate Effects of Behavioural and Subjective Self-Relevance Manipulations on Measured Behavioural Self-Relevance.

The ANCOVA revealed that the behavioural self-relevance manipulation did not manipulate measured behavioural self-relevance, either as a main effect, $F(1, 50) = .22$, $p = .64$, $\eta_p^2 = .004$, or as an interaction with the subjective self-relevance manipulation, $F(1, 50) = .12$, $p = .73$, $\eta_p^2 = .002$.

4.4.2.2. Univariate Effects of Behavioural and Subjective Self-Relevance Manipulations on Measured Subjective Self-Relevance.[14]

The ANCOVA revealed that the subjective self-relevance manipulation did not manipulate measured subjective self-relevance, either as a main effect, $F(1, 50) = .07$, $p = .8$, $\eta_p^2 = .001$, or as an interaction with the behavioural self-relevance manipulation, $F(1, 50) = 1.12$, $p = .3$, $\eta_p^2 = .02$.

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[14] When excluding outliers, the main effect of manipulated subjective self-relevance on measured subjective self-relevance remained non-significant, $F(1, 47) = .75$, $p = .39$, $\eta_p^2 = .02$. However, the interaction between the behavioural and subjective self-relevance manipulations on measured subjective self-relevance became significant, $F(1, 47) = 5.33$, $p = .03$, $\eta_p^2 = .1$ (medium-to-large-sized). *Post hoc* pairwise comparisons revealed that, when manipulated subjective self-relevance was present only, measured subjective self-relevance was greater when manipulated behavioural self-relevance was absent (M=4.19, SE=.54) compared to when manipulated behavioural self-relevance was present (M=2.26, SE=.63), $p = .02$. Additionally, when manipulated behavioural self-relevance was present only, measured subjective self-relevance was greater when manipulated subjective self-relevance was absent (M=4.12, SE=.61) compared to when manipulated subjective self-relevance was present (M=2.26, SE=.63), $p = .04$.

4.2.4. Discussion and Conclusion

The current follow-up/pilot study found that the manipulations from Study 2 may not be effective in manipulating behavioural and subjective self-relevance, suggesting that null effects from Study 2 may be arising from ineffectiveness of the manipulations. These manipulations may have failed due to food neophobia: Specifically, the manipulations may have inadvertently reduced willingness to imagine the situation due to a reluctance to engage with novel meats (e.g., Çınar et al., 2021; Damsbo-Svendsen et al., 2017). To overcome this limitation, Pilot Studies 2a, 3a and 4a (Sections 4.3. to 4.5.) test an alternative self-relevance manipulation which utilises an imagined restaurant scenario instead, and uses the common dish of spaghetti bolognese instead of meat specifically as a way to potentially reduce food neophobia.

4.3. Pilot Study 2a to Test Amended Behavioural and Subjective Self-Relevance Manipulations

4.3.1. Introduction

Due to the previous behavioural and subjective self-relevance manipulations failing to effectively manipulate behavioural and subjective self-relevance, the current pilot study aims to test and pilot alternative behavioural and subjective self-relevance manipulations developed by the current researcher. Specifically, behavioural and subjective self-relevance are now manipulated through an imagined restaurant scenario whereby participants imagine consuming a meat dish, which is either described favourably (subjective self-relevance) or unfavourably (lack of subjective self-relevance) and is later revealed to contain meat from the participant's target animal (manipulation of behavioural self-relevance). These manipulations are designed to overcome any issues with food neophobia from the previous manipulations (e.g., lack of willingness to try new forms of meat; Çınar et al., 2021; Damsbo-Svendsen et al., 2017) by a) referring to the dish of spaghetti bolognese instead of meat directly, and b) revealing what animal the meat comes from only at the end of the manipulation (as opposed to the original manipulations which stated the source of the meat straightaway). As with Study 2, an unknown animal (tree kangaroo) is utilised as the target animal, as an adapted version of the novel animal paradigm to assess unmoderated effects of familiarity. To check effectiveness of the behavioural self-relevance manipulation (manipulation check), the single item '*How many days a week would you be willing to eat meat from this species?*' is included to measure behavioural self-relevance. To check effectiveness of the subjective self-relevance manipulation (manipulation check), the single item '*How much do you like the spaghetti bolognese presented in this scenario?*' is included to measure subjective self-relevance. Designed to reduce food neophobia (Çınar et al., 2021; Damsbo-Svendsen et al., 2017), I hypothesise that:

H1: Imagining consuming a meat dish will significantly increase measured behavioural self-relevance post-manipulation (compared to pre-manipulation).

H2: The meat dish being described favourably (vs. unfavourably) will significantly increase measured subjective self-relevance.

Note that this pilot study utilises the same participant sample to also pilot a manipulation for familiarity, but only information relevant to the behavioural and subjective self-relevance manipulations is reported within the current chapter (see Section 6.2. for pilot study information about the familiarity manipulation [Pilot Study 2b]).

4.3.2. Methods

4.3.2.1. Participants.

Sixty participants were recruited via social media and Sona as a volunteer sample. Nineteen participants were excluded for providing partial data, and 11 participants were excluded for not consuming meat, meaning that all remaining participants were meat consumers only. As all participants stated they were either a man or woman, no participants had to be excluded to enable gender to be dummy coded for inclusion of gender as a covariate (see Section 4.3.3. for further discussion). Exclusions left a total sample size of 30 participants (50% women, 50% men; M_{age}=25.7, SD_{age}=6.87, age range: 18-50), which exceeds the recommend 12 participants per condition for pilot studies (Julious, 2005). Participants within each condition are shown in Table 6. Demographics of the sample are reported as follows in percentages. For nationality: 46.7% (United Kingdom/British), and 3.3% each (Australian, Canadian, Croatian, dual Dutch/Norwegian, Finnish, French, German, Greek, Israeli, Italian, Japanese, Lithuanian, Malaysian, Spanish, Taiwanese, United States). For ethnicity: 63.2% (White), 19.9% (Asian), 10% (Black), and 6.6% (mixed). For country of residence (M_{duration}=16.44, SD_{duration}=9.98, range: 9 months to 35 years): 63.3% (United Kingdom), 6.7% (Malaysia), and 3.3% each (Croatia, Finland, France, Germany, Greece, Hong Kong, Israel, no response, and Norway). For religion: 33.3% (atheism), 23.3% (Christianity), 13.3% each (agnosticism, would rather not say), 6.7% (no response), and 3.3% each (Hinduism, Islam, Judaism).

Table 6.
Participants Within Each Condition for Pilot Study 2a.

Subjective Self-Relevance Condition	Number of Participants
Present	15
Absent	15

4.3.2.2. Design.

The current pilot study follows an ANCOVA design, with a one-way (behavioural self-relevance: pre-manipulation vs. post-manipulation) within-subjects ANCOVA on measured behavioural self-relevance, and a one-way (subjective self-relevance: present vs. absent) between-subjects ANCOVA on measured subjective self-relevance. Behavioural and subjective self-relevance were included as DVs to test effectiveness of the manipulation. Gender and neutrality were included as covariates (see Section 4.3.3. for further discussion).

4.3.2.3. Materials.

4.3.2.3.1. Target Animal and Animal Photograph.

The current pilot study employed the same photograph of the tree kangaroo as Study 2, whereby this image was sourced from https://www.shutterstock.com/image-photo/close-shot-cute-tree-kangaroo-168261035. Like Study 2, this photograph was included to enable easier visualisation of the imagined scenario. However, unlike Study 2, this photograph was also used here to ensure participants knew what their target animal was, whilst avoiding informing participants of the name of the species. For instance, the name 'tree kangaroo' may have impacted participants' perceptions of the animal due to the names' association with kangaroos, or because seemingly neutral names influence perceptions of stimuli (Köhler, 1947; Maurer et al., 2006; Ramachandran & Hubbard, 2001). Thus, the current pilot study improved upon Study 2 to further reduce preconceptions and bias by withholding the species name.

4.3.2.3.2. Behavioural and Subjective Self-Relevance Manipulations.

As imagined scenarios with animals have previously been utilised to inform perceptions of animals (Auger & Amiot, 2019b), behavioural self-relevance was manipulated via an imagined restaurant scenario, employing images and text developed by the researcher in order to enhance realism of the scenario, whereby participants imagined consuming a meat dish in a fictional restaurant. Specifically, participants read the following text to set the scene: '*You will now be asked to take part in an imaginary scenario. Please engage with the text and photographs provided. You enter the below restaurant. When inside the restaurant, you are greeted by the waitress in this picture. The waitress takes you to your table below. When sat at your table, you read the menu. After some consideration, you eventually decide on ordering a spaghetti bolognese. After a short wait, your spaghetti bolognese is brought to you and you start to eat.'* Images accompanying this text can be seen in Appendix 6. As the manipulation of subjective self-relevance, participants then read the text: '*Whilst eating the spaghetti bolognese, you remark to yourself how flavoursome/flavourless the dish is. The dish is perfectly seasoned/under-seasoned, and the ingredients [do not] blend well',* whereby the text stating that the dish was '*flavoursome*', '*perfectly seasoned*' and that '*the ingredients blend well*' is the subjective self-relevance condition, and the text stating that the dish was '*flavourless*', '*under-seasoned*' and that '*the ingredients do not blend well*' is the lack of subjective self-relevance condition. To reveal to participants that the spaghetti bolognese dish actually contained meat from the participants' target animal (i.e., tree kangaroo), as a way to use salience of imagining having consumed the animal as a (pre- vs. post-) manipulation of behavioural self-relevance, participants read the following text: '*After you finish your meal, you go to pay the bill. The waitress asks you if you enjoyed your meal. She then reveals to you that the meat in your spaghetti bolognese came from the species you saw in the first photograph (pictured again below)*'.

4.3.2.3.3. Measured Behavioural Self-Relevance (Manipulation Check).

As a scale to measure behavioural self-relevance has not yet been created, behavioural self-relevance was measured via the single item developed by the researcher: *'How many days a week would you be willing to eat meat from this species?'* from zero to seven days per week. A higher score indicates greater behavioural self-relevance.

4.3.2.3.4. Measured Subjective Self-Relevance (Manipulation Check).

As a scale to measure subjective self-relevance has not yet been developed, subjective self-relevance was measured via the single item developed by the researcher: '*How much do you like the spaghetti bolognese presented in this scenario?*' on a visual analogue from zero ('*not at all*') to 100 ('*very much*'). A higher score indicates greater subjective self-relevance.

4.3.2.3.5. Attention Check.

Attention paid to and memory for the manipulation was tested through an attention check developed by the researcher: '*What dish did the restaurant scenario refer to?*', with the correct answer being '*spaghetti bolognese*'. This check aimed to test that participants paid attention to and remembered the text. No participants were removed for failing this attention check.

4.3.2.3.6. Vividness of the Self-Relevance Manipulation.

Perceived vividness of the imagined self-relevance manipulation was measured, as imagined scenarios which are viewed as more vivid have greater impacts on behavioural intentions (Husnu & Crisp, 2010). As with Pilot Study 1a, vividness was measured through a six-item semantic differential vividness measure from Husnu and Crisp (2010; α=.94), whereby participants answer how much they perceive their imagined scenario as being '*faint vs. vivid*', '*fuzzy vs. clear*', '*dim vs. bright*', '*vague vs. sharp*', '*dull vs. lively*', and '*simple vs. detailed*'. Reliability was adequate for this scale within this study, ω=.86. Therefore, items were summed together to create a total vividness score. Higher scores indicate greater vividness. No items are reverse-scored. The majority of the sample (>50%) perceived the self-relevance manipulation to be vivid.

4.3.2.3.7. Ease of Imaginability of the Self-Relevance Manipulation.

Perceived ease of imaginability of the imagined self-relevance manipulation was measured in order to ensure participants were able to imagine the imagined scenario without difficulty. As with Pilot Study 1a, ease of imaginability was measured through a single item '*How easy or difficult was it for you to imagine the restaurant scenario?*' on a -50 (extremely difficult) to 50 (extremely easy) visual analogue scale, informed by previous literature (e.g., Black & Barnes, 2020; Broemer & Diehl, 2004). A higher score indicates greater ease of imaginability. The majority of the sample (>50%) perceived the self-relevance manipulation to be easy to imagine.

4.3.2.3.8. Perceived Neutrality Towards the Animal.

Perceived neutrality was included as a covariate to account for bias and preconceptions in perceptions of the target animal. Due to lack of a pre-existing scale to measure perceived neutrality towards the animal, perceived neutrality was measured via a single item developed by the researcher: '*How neutral do you perceive the species in the previous photograph to be?*' on a visual analogue scale from zero ('*not neutral at all*') to 100 ('*most definitely neutrality*'). Neutrality was defined as '*By neutral, we mean how non-biased you believe your opinions of the species are. Higher scores mean less bias, whilst lower scores mean more bias*'. A higher score indicates higher neutrality and less bias.

4.3.2.4. Procedure.

Participants were recruited via social media and Sona. The experiment was conducted in July 2021 as a voluntary, open survey. After providing informed consent, participants were asked if they recognised tree kangaroos, alongside a photograph of the animal. The study either proceeded using the tree kangaroo as the target animal, or, if participants recognised the tree kangaroo, they were redirected towards the end of the study and did not participate further.

Following initial recognition stage, participants provided demographics and stated their perceived neutrality towards the animal and their initial behavioural self-relevance. Participants then completed the two sections (self-relevance, familiarity) of the pilot study in a randomised order. Here, only the self-relevance section is described (see Section 6.2. for description of the familiarity section). For the self-relevance section, all participants first read the imagined restaurant scenario described in Section 4.3.2.3.2. and were randomly allocated to read either the subjective self-relevance text or lack of subjective self-relevance text nested within this scenario. After reading their subjective self-relevance text, participants then rated how much they liked the dish (measure of subjective self-relevance; manipulation check), before reading that the dish contained meat from their target animal. After reading this text, participants again indicated their behavioural self-relevance of the animal (manipulation check), stated how vivid and easy to imagine the scenario was, and answered the attention check. Finally, participants had the chance to report technical difficulties and provide any final comments about the study, before being debriefed. Two participants reported technical difficulties, but their responses were complete and maintained within analyses.

4.3.3. Analyses

A one-way (behavioural self-relevance: pre-manipulation vs. post-manipulation) within-subjects ANCOVA, including gender and neutrality as covariates, was conducted on measured behavioural self-relevance, to test if the manipulation effectively manipulates behavioural self-relevance. Additionally, a one-way (subjective self-relevance: present vs. absent) between-subjects ANCOVA, including gender and neutrality as covariates, was conducted on measured subjective self-relevance, to test if the manipulation effectively manipulates subjective self-relevance. Note that the behavioural and subjective self-relevance manipulations could not be combined into one ANCOVA as IVs, as the subjective self-relevance manipulation is nested within the behavioural self-relevance manipulation.

Gender was again included as a covariate within these ANCOVAs. Although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analyses by controlling for and partialling out any relationship between gender and the outcome variables (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and measured behavioural and subjective self-relevance (the outcome variables) to be statistically controlled for. Neutrality was also included within analyses as a covariate to account for bias in perceptions of animals. That is, by including neutrality as a covariate, the statistical model is then adjusted to account for this variable, thereby reducing variability and bias in the findings (Keen & Tiemeier, 2022), and increasing power of the analyses by statistically controlling for any possible relationship between neutrality and behavioural and subjective self-relevance (Tabachnick & Fidell, 2014).

4.3.3.1. Statistical Assumptions to Test H1: Exploring Effects of Behavioural Self-Relevance Manipulation on Measured Behavioural Self-Relevance (One-Way ANCOVA).

Measured behavioural self-relevance failed normality both pre- and post-manipulation, $p < .05$. Excessive skewness, multiple extreme univariate outliers, and floor effects in measured behavioural self-relevance meant assumptions for the ANCOVA were violated. Running the ANCOVA including and excluding the univariate outliers was not possible due to the floor effects. However, I proceeded with this ANCOVA due to robustness of ANCOVA to non-normality, and I report this ANCOVA including outliers to reflect the unamended dataset. Results from this ANCOVA should be interpreted with caution.

4.3.3.2. Statistical Assumptions to Test H2: Exploring Effects of Subjective Self-Relevance Manipulation on Measured Subjective Self-Relevance (One-Way ANCOVA).

The normality assumption for measured subjective self-relevance was met as assessed through a normality test across conditions, $p > .05$. Skewness was also acceptable across conditions. There were outliers in measured subjective self-relevance in the subjective self-relevance condition. Running the analysis including and excluding these outliers did not change conclusions. I report this ANCOVA including outliers to reflect the unamended dataset. Homogeneity of variances was present, $p = .35$.

4.3.3.3. Testing H1: Exploring Effects of Behavioural Self-Relevance Manipulation on Measured Behavioural Self-Relevance.

A one-way (behavioural self-relevance: pre-manipulation vs. post-manipulation) within-subjects ANCOVA, including gender and neutrality as covariates, was run on measured behavioural self-relevance to test **H1. Not supporting H1:** There was no significant main effect of manipulated behavioural self-relevance on measured behavioural self-relevance, $F(1, 27) = .39$, $p = .54$, $\eta_p^2 = .01$.

4.3.3.4. Testing H2: Exploring Effects of Subjective Self-Relevance Manipulation on Measured Subjective Self-Relevance.

A one-way (subjective self-relevance: present vs. absent) between-subjects ANCOVA, including gender and neutrality as covariates, was run on measured subjective self-relevance to test **H2. Supporting H2:** There was a significant main effect of manipulated subjective self-relevance on measured subjective self-relevance in the expected direction, $F(1, 26) = 47.92$, $p < .001$, $\eta_p^2 = .65$ (large-sized). That is, the subjective self-relevance manipulation caused greater measured subjective self-relevance (M=73.53, SD=23.57) than when subjective self-relevance was absent (M=21.93, SD=14.54).

4.3.4. Discussion and Conclusion

As expected, the subjective self-relevance condition led to greater subjective self-relevance than the lack of subjective self-relevance condition, thereby supporting **H2.** Therefore, the current study demonstrates that the subjective self-relevance manipulation developed by the researcher is effective at manipulating subjective self-relevance. Informed by these findings, the subjective self-relevance manipulation is utilised within Study 3 to test causal effects of subjective self-relevance on pet speciesism. As the subjective self-relevance manipulation was found to be effective in manipulating subjective self-relevance within the current pilot study, this manipulation is unchanged within Study 3.

However, not supporting **H1,** the behavioural self-relevance manipulation had no effect on measured behavioural self-relevance. This lack of effectiveness may have arisen from floor effects in the behavioural self-relevance manipulation check measure, whereby most participants were unwilling to consume meat from the animal. Therefore, before applying the behavioural self-relevance manipulation to pet speciesism, Pilot Studies 3a and 4a re-test the behavioural self-relevance manipulation with amendments to the behavioural self-relevance manipulation check item, to try to reduce floor effects and thereby see if the behavioural self-relevance manipulation effectively increases behavioural self-relevance. Specifically, Pilot Study 3a adds the following statement before participants answer the behavioural self-relevance manipulation check item, as a way to ensure equal availability of the meat and equal harm caused to the animal compared to standard 'food' animals: '*Presuming meat from the species in the previous photograph is readily available in shops and does not cause any more harm than eating meat from animals such as cows'*.

4.4. Pilot Study 3a to Test Behavioural Self-Relevance Manipulation

4.4.1. Introduction

Due to the behavioural self-relevance manipulation failing to effectively manipulate behavioural self-relevance within Pilot Study 2a, the current pilot study aims to re-test this behavioural self-relevance manipulation with an amendment to the behavioural self-relevance manipulation check item, as a way to reduce floor effects in this manipulation check item. Therefore, behavioural self-relevance is again manipulated through an imagined restaurant scenario whereby participants imagine consuming a meat dish and is later revealed to contain meat from the participant's target animal (again, an unknown animal). To check effectiveness of the behavioural self-relevance manipulation (manipulation check), the item '*How many days a week would you be willing to eat meat from this species?*' is again included to measure behavioural self-relevance. However, within this pilot study, the following statement is added before participants answer the behavioural self-relevance manipulation check item, as a way to ensure equal availability of the meat and equal harm caused to the animal compared to standard 'food' animals: '*Presuming meat from the species in the previous photograph is readily available in shops and does not cause any more harm than eating meat from animals such as cows'*. With this updated behavioural self-relevance manipulation check item, I hypothesise that:

H1: Imagining consuming a meat dish will significantly increase measured behavioural self-relevance post-manipulation (compared to pre-manipulation).

Note that this pilot study utilises the same participant sample to also pilot a manipulation for familiarity, but only information relevant to the behavioural self-relevance manipulation is reported within the current chapter (see Section 6.3. for pilot study information about the familiarity manipulation [Pilot Study 3b]).

4.4.2. Methods

4.4.2.1. Participants.

Fifty-five participants were recruited via social media and Sona as a volunteer sample. Eighteen participants were excluded for providing partial data, and seven participants were excluded for not consuming meat (meaning that all remaining participants were meat consumers only). As all participants stated they were either a man or woman, no participants had to be excluded to enable gender to be dummy coded for inclusion of gender as a covariate (see Section 4.4.3. for further discussion). Exclusions left a total sample size of 30 participants (50% women, 50% men; $M_{\text{age}} = 25.3$, $SD_{\text{age}} = 6.13$, age range: 18-50), which exceeds the recommend 12 participants per condition for pilot studies (Julious, 2005). Demographics of the sample are reported as follows in percentages. For nationality: 16.7% (United States), 13.3% (British), 6.7% each (Chinese, Colombian, Filipino, French), and 3.3% each (Canadian, Croatian, Czech, Danish, Dutch, Estonian, Indian, Indonesian, Italian, Malaysian, Polish, Swedish, Taiwanese). For ethnicity: 53% (White), 26.5% (Asian), 10% (mixed), and 3.3% each (Black, Hispanic, Latin American). For country of residence (M_{duration}=17.79, SD_{duration}=11.79, range: 1 month to 50 years): 23.3% (United States), 20% (United Kingdom), 10% (France), 6.7% each (Germany, the Philippines), and 3.3% each (Canada, Croatia, Czech Republic, Denmark, Hungary, Indonesia, Malaysia, Poland, Sweden, the Netherlands). For religion: 40% (Christianity), 26.7% (atheism), 10% each (agnosticism, would rather not say), and 3.3% each (Buddhism, Hinduism, Judaism, no religion).

4.4.2.2. Design.

The current pilot study follows a one-way (behavioural self-relevance: pre- vs. post-manipulation) within-subjects ANCOVA design on measured behavioural self-relevance. Behavioural self-relevance was included as a DV to test effectiveness of the manipulation. Gender and neutrality were included as covariates (see Section 4.4.3. for further discussion).

4.4.2.3. Materials.

4.4.2.3.1. Target Animal and Animal Photograph.

The current pilot study employed the same photograph of the tree kangaroo as Study 2 and Pilot Study 2a, whereby this image was sourced from https://www.shutterstock.com/image-photo/close-shot-cute-tree-kangaroo-168261035. This photograph enables easier visualisation of the imagined scenario and reduces biased perceptions of the animal due to species name.

4.4.2.3.2. Behavioural Self-Relevance Manipulation.

Behavioural self-relevance was again manipulated via an imagined restaurant scenario, employing images and text developed by the researcher in order to enhance realism of the scenario, whereby participants imagined consuming a meat dish in a fictional restaurant. Specifically, participants read the following text to set the scene: '*You will now be asked to take part in an imaginary scenario. Please engage with the text and photographs provided. You enter the below restaurant.* W*hen inside the restaurant, you are greeted by the waitress in this picture. The waitress takes you to your table below. When sat at your table, you read the menu. After some consideration, you eventually decide on ordering a spaghetti bolognese. After a short wait, your spaghetti bolognese is brought to you and you start to eat.'* Images accompanying this text can be seen in Appendix 6. As the manipulation of subjective self-relevance, participants then read the text: '*Whilst eating the spaghetti bolognese, you remark to yourself how flavoursome/flavourless the dish is. The dish is perfectly seasoned/under-seasoned, and the ingredients [do not] blend well',* whereby the text stating that the dish was '*flavoursome*', '*perfectly seasoned*' and that '*the ingredients blend well*' is the subjective self-relevance condition, and the text stating that the dish was '*flavourless*', '*under-seasoned*' and that '*the ingredients do not blend well*' is the lack of subjective self-relevance condition. To reveal to participants that the spaghetti bolognese dish actually contained meat from the participants' target animal (i.e., tree kangaroo), as a way to use salience of imagining having consumed the animal as a (pre- vs. post-) manipulation of behavioural self-relevance, participants read the following text: '*After you finish your meal, you go to pay the bill. The waitress asks you if you enjoyed your meal. She then reveals to you that the meat in your spaghetti bolognese came from the species you saw in the first photograph (pictured again below)*'.

4.4.2.3.3. Measured Behavioural Self-Relevance (Manipulation Check).

Behavioural self-relevance was again measured via the single item developed by the researcher: *'How many days a week would you be willing to eat meat from this species?'* from zero to seven days per week. However, the following statement was added before the behavioural self-relevance item to attempt to reduce floor effects, by reducing any reluctance to consume the meat from the animal by presenting the meat as akin to other meats: '*Presuming meat from the species in the previous photograph is readily available in shops and does not cause any more harm than eating meat from animals such as cows'.* A higher score indicates greater behavioural self-relevance.

4.4.2.3.4. Attention Check.

Attention paid to and memory for the manipulation was again tested through an attention check developed by the researcher: '*What dish did the restaurant scenario refer to?*', with the correct answer being '*spaghetti bolognese*'. This check aimed to test that participants paid attention to and remembered the text. No participants were removed for failing this attention check.

4.4.2.3.5. Vividness of the Self-Relevance Manipulation.

Perceived vividness of the imagined self-relevance manipulation was measured, as imagined scenarios which are viewed as more vivid have greater impacts on behavioural intentions (Husnu & Crisp, 2010). As with Pilot Studies 1a and 2a, vividness was measured through a six-item semantic differential vividness measure from Husnu and Crisp (2010; α=.94), whereby participants answer how much they perceive their imagined scenario as being '*faint vs. vivid*', '*fuzzy vs. clear*', '*dim vs. bright*', '*vague vs. sharp*', '*dull vs. lively*', and '*simple vs. detailed*'. Reliability was adequate for this scale within this study, ω=.92. Therefore, items were summed together to create a total vividness score. Higher scores indicate greater vividness. No items are reverse-scored. The majority of the sample (>50%) perceived the self-relevance manipulation to be vivid.

4.4.2.3.6. Ease of Imaginability of the Self-Relevance Manipulation.

Perceived ease of imaginability of the imagined self-relevance manipulation was measured in order to ensure participants were able to imagine the imagined scenario without difficulty. As with Pilot Studies 1a and 2a, ease of imaginability was measured through a single item '*How easy or difficult was it for you to imagine the restaurant scenario?*' on a -50 (extremely difficult) to 50 (extremely easy) visual analogue scale, informed by previous literature (e.g., Black & Barnes, 2020; Broemer & Diehl, 2004). A higher score indicates greater ease of imaginability. The majority of the sample (>50%) perceived the self-relevance manipulation to be easy to imagine.

4.4.2.3.7. Perceived Neutrality Towards the Animal.

Perceived neutrality was included as a covariate to account for bias and preconceptions in perceptions of the target animal. Due to lack of a pre-existing scale to measure perceived neutrality towards the animal, perceived neutrality was measured via a single item developed by the researcher: '*How neutral do you perceive the species in the previous photograph to be?*' on a visual analogue scale from zero ('*not neutral at all*') to 100 ('*most definitely neutrality*'). Neutrality was defined as '*By neutral, we mean how non-biased you believe your opinions of the species are. Higher scores mean less bias, whilst lower scores mean more bias*'. A higher score indicates higher neutrality and less bias.

4.4.2.4. Procedure.

Participants were recruited via social media and Sona. The experiment was conducted in September 2021 as a voluntary, open survey. After providing informed consent, participants were asked if they recognised tree kangaroos, alongside a photograph of the animal. The study either proceeded using the tree kangaroo as the target animal, or, if participants recognised the tree kangaroo, they were redirected towards the end of the study and did not participate further.

Following initial recognition stage, participants provided demographics and stated their perceived neutrality towards the animal and their initial behavioural self-relevance. Participants then completed the two sections (self-relevance, familiarity) of the pilot study in a randomised order. Here, only the self-relevance section is described (see Section 6.3. for description of the familiarity section). For the self-relevance section, all participants first read the imagined restaurant scenario described in Section 4.4.2.3.2. including reading that the dish contained meat from their target animal. After reading this text, participants again indicated their behavioural self-relevance of the animal (manipulation check), stated how vivid and easy to imagine the scenario was, and answered the attention check. Finally, participants had the chance to report technical difficulties and provide any final comments about the study, before being debriefed. Three participants reported technical difficulties, but their responses were complete and maintained within analyses.

4.4.3. Analyses

A one-way (behavioural self-relevance: pre-manipulation vs. post-manipulation) within-subjects ANCOVA, including gender and neutrality as covariates, was conducted on measured behavioural self-relevance, to test if the manipulation effectively manipulates behavioural self-relevance. Gender was again included as a covariate within this ANCOVA. Although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analyses by controlling for and partialling out any relationship between gender and the outcome variable (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013;

Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and measured behavioural self-relevance (the outcome variable) to be statistically controlled for. Neutrality was also included within analyses as a covariate to account for bias in perceptions of animals. That is, by including neutrality as a covariate, the statistical model is then adjusted to account for this variable, thereby reducing variability and bias in the findings (Keen & Tiemeier, 2022), and increasing power of the analyses by statistically controlling for any possible relationship between neutrality and behavioural self-relevance (Tabachnick & Fidell, 2014).

4.4.3.1. Statistical Assumptions to Test H1: Exploring Effects of Behavioural Self-Relevance Manipulation on Measured Behavioural Self-Relevance (One-Way ANCOVA).

Measured behavioural self-relevance failed normality both pre- and post-manipulation, $p < .05$, but skewness was acceptable. There were outliers in measured behavioural self-relevance both pre- and post-manipulation. Running the analysis including and excluding these outliers did not change conclusions. I report this ANCOVA including outliers to reflect the unamended dataset.

4.4.3.2. Testing H1: Exploring Effects of Behavioural Self-Relevance Manipulation on Measured Behavioural Self-Relevance.

A one-way (behavioural self-relevance: pre-manipulation vs. post-manipulation) within-subjects ANCOVA, including gender and neutrality as covariates, was run on measured behavioural self-relevance to test **H1. Not supporting H1:** There was no significant main effect of manipulated behavioural self-relevance on measured behavioural self-relevance, $F(1, 27) = -.04$, $p = .85$, $\eta_p^2 = .001$.

4.4.4. Discussion and Conclusion

Not supporting **H1,** the behavioural self-relevance manipulation again had no effect on measured behavioural self-relevance, although this time floor effects in the behavioural self-relevance manipulation check were not present. This lack of effectiveness may have arisen from an insufficiently large and underpowered sample size. Additionally, even though floor effects were not present in the behavioural self-relevance manipulation check item, the mean score for this item was still low both pre-manipulation, *M* = 1.07, and post-manipulation, *M* = 1.27. Therefore, before applying the behavioural self-relevance manipulation to pet speciesism, Pilot Study 4a re-tests the behavioural self-relevance manipulation with a further amendment to the behavioural self-relevance manipulation check item, whereby participants are now asked '*How willing would you be to include meat from this species within your diet?'* on a 0-100 visual analogue scale, rather than how many days per week they would be willing to consume meat from the animal. This re-scaling and change in wording of the item should enhance spread of scores, and therefore better enable detection of whether the behavioural self-relevance manipulation is effective or not. Additionally, Pilot Study 4a tests the behavioural self-relevance manipulation with a larger sample size in line with a G*Power power analysis, in case current null effects are due to an underpowered analysis.

4.5. Pilot Study 4a to Test Behavioural Self-Relevance Manipulation

4.5.1. Introduction

Due to the behavioural self-relevance manipulation again failing to effectively manipulate behavioural self-relevance within Pilot Study 3a, the current pilot study aims to re-test this behavioural self-relevance manipulation with an additional amendment to the behavioural self-relevance manipulation check item. The current pilot study also aims to test the behavioural self-relevance manipulation with a larger sample size, in case the analysis is underpowered. Therefore, behavioural self-relevance is again manipulated through an imagined restaurant scenario whereby participants imagine consuming a meat dish and is later revealed to contain meat from the participant's target animal (again, an unknown animal). To check effectiveness of the behavioural self-relevance manipulation (manipulation check), the item '*How willing would you be to include meat from this species within your diet?*' on a 0-100 visual analogue scale is included to measure behavioural self-relevance, which has been amended from days per week in Pilot Studies 2a and 3a to more general willingness within the current pilot study as a way to enhance spread of scores, and therefore better enable detection of whether the behavioural self-relevance manipulation is effective or not. Additionally, as with Pilot Study 3a, the following statement is included before participants answer the behavioural self-relevance manipulation check item, as a way to reduce floor effects by ensuring equal availability of the meat and equal harm caused to the animal compared to standard 'food' animals: '*Presuming meat from the species in the previous photograph is readily available in shops and does not cause any more harm than eating meat from animals such as cows'.* With this updated behavioural self-relevance manipulation check item and a larger sample size, I hypothesise that:

H1: Imagining consuming a meat dish will significantly increase measured behavioural self-relevance post-manipulation (compared to pre-manipulation).

Note that this pilot study utilises the same participant sample to also pilot a manipulation for familiarity, but only information relevant to the behavioural self-relevance manipulation is reported within the current chapter (see Section 6.4. for pilot study information about the familiarity manipulation [Pilot Study 4b]).

4.5.2. Methods

4.5.2.1. Participants.

One-hundred-and-sixty participants were recruited via Prolific as a volunteer sample. Quota sampling was partially used through Prolific's 'balance by sex'[15] option to obtain approximately equal numbers of men and women. Thirty participants were excluded for: recognising the tree kangaroo ($n = 16$), taking part in a previous study within this project ($n = 7$), withdrawing from the study ($n = 5$), and not consuming meat ($n = 2$, meaning that all remaining participants were meat consumers only). As all participants stated they were either a man or woman, no participants had to be excluded to enable gender to be dummy coded for inclusion of gender as a covariate (see Section 4.5.3. for further discussion). Exclusions left a total sample size of 130 participants (51.5% women, 48.5% men; $M_{\text{age}} = 24.78$, $SD_{\text{age}} = 7.13$, age range: 18-56), which exceeded the minimum required sample size of 128 per a G*Power *a priori* power analysis for a ANCOVA analysis (medium effect size f=.25, two groups, two covariates, one numerator df, α=.05, power = .8). Demographics of the sample are reported as follows in percentages, with demographic categories which make up less than 2% of the sample being collapsed into 'other'. For nationality: 35.4% (South African), 15.4% (Portuguese), 9.2% (Polish), 5.4% (Italian), 4.6% (Zimbabwean), 3.8% (Hungarian), 3.1% each (British, Mexican), 2.3% (Spanish), and 17.7% other. For ethnicity: 49.5% (White), 34.6% (Black), 6.2% (mixed), 3.8% each (Asian, would rather not say), and 2.1% other. For country of residence (M_{duration}=22.54, SD_{duration}=8.81, range: 3 months to 56 years): 42.3% (South Africa), 15.4% (Portugal), 8.5% (Poland), 6.9% (Italy), 6.1% (United Kingdom), 4.6% (Hungary), 3.1% (Mexico), 2.3% (Spain), and 10.8% other. For religion: 63.8%

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[15] Prolific does not provide an option to 'balance by gender'.

(Christianity), 19.2% (atheism), 8.5% (agnosticism), 3.8% (would rather not say), and 4.7% other.

4.5.2.2. Design.

The current pilot study follows a one-way (behavioural self-relevance: pre- vs. post-manipulation) within-subjects ANCOVA design on measured behavioural self-relevance. Behavioural self-relevance was included as a DV to test effectiveness of the manipulation. Gender and neutrality were included as covariates (see Section 4.5.3. for further discussion).

4.5.2.3. Materials.

4.5.2.3.1. Target Animal and Animal Photograph.

The current pilot study employed the same photograph of the tree kangaroo as Study 2 and Pilot Studies 2a and 3a, whereby this image was sourced from https://www.shutterstock.com/image-photo/close-shot-cute-tree-kangaroo-168261035. This photograph enables easier visualisation of the imagined scenario and reduces biased perceptions of the animal due to species name.

4.5.2.3.2. Behavioural Self-Relevance Manipulation.

Behavioural self-relevance was again manipulated via an imagined restaurant scenario, employing images and text developed by the researcher in order to enhance realism of the scenario, whereby participants imagined consuming a meat dish in a fictional restaurant. Specifically, participants read the following text to set the scene: '*You will now be asked to take part in an imaginary scenario. Please engage with the text and photographs provided. You enter the below restaurant. When inside the restaurant, you are greeted by the waitress in this picture. The waitress takes you to your table below. When sat at your table, you read the menu. After some consideration, you eventually decide on ordering a spaghetti bolognese. After a short wait, your spaghetti bolognese is brought to you and you start to* *eat.'* Images accompanying this text can be seen in Appendix 6. As the manipulation of subjective self-relevance, participants then read the text: '*Whilst eating the spaghetti bolognese, you remark to yourself how flavoursome/flavourless the dish is. The dish is perfectly seasoned/under-seasoned, and the ingredients [do not] blend well',* whereby the text stating that the dish was '*flavoursome*', '*perfectly seasoned*' and that '*the ingredients blend well*' is the subjective self-relevance condition, and the text stating that the dish was '*flavourless*', '*under-seasoned*' and that '*the ingredients do not blend well*' is the lack of subjective self-relevance condition. To reveal to participants that the spaghetti bolognese dish actually contained meat from the participants' target animal (i.e., tree kangaroo), as a way to use salience of imagining having consumed the animal as a (pre- vs. post-) manipulation of behavioural self-relevance, participants read the following text: '*After you finish your meal, you go to pay the bill. The waitress asks you if you enjoyed your meal. She then reveals to you that the meat in your spaghetti bolognese came from the species you saw in the first photograph (pictured again below)*'.

4.5.2.3.3. Measured Behavioural Self-Relevance (Manipulation Check).

Behavioural self-relevance was measured via the single item developed by the researcher: *'How willing would you be to include meat from this species within your diet?'* on a zero ('*not at all willing*') to 100 ('*extremely willing*') visual analogue scale. The following statement was also included before the behavioural self-relevance item to reduce floor effects, by reducing any reluctance to consume the meat from the animal by presenting the meat as akin to other meats: '*Presuming meat from the species in the previous photograph is readily available in shops and does not cause any more harm than eating meat from animals such as cows'.* A higher score indicates greater behavioural self-relevance.

4.5.2.3.4. Attention Check.

Attention paid to and memory for the manipulation was again tested through an attention check developed by the researcher: '*What dish did the restaurant scenario refer to?*', with the correct answer being '*spaghetti bolognese*'. This check aimed to test that participants paid attention to and remembered the text. No participants were removed for failing this attention check.

4.5.2.3.5. Perceived Neutrality Towards the Animal.

Perceived neutrality was included as a covariate to account for bias and preconceptions in perceptions of the target animal. Due to lack of a pre-existing scale to measure perceived neutrality towards the animal, perceived neutrality was measured via a single item developed by the researcher: '*How neutral do you perceive the species in the previous photograph to be?*' on a visual analogue scale from zero ('*not neutral at all*') to 100 ('*most definitely neutrality'*). Neutrality was defined as '*By neutral, we mean how non-biased you believe your opinions of the species are. Higher scores mean less bias, whilst lower scores mean more bias*'. A higher score indicates higher neutrality and less bias.

4.5.2.4. Procedure

Participants were recruited via Prolific. All participants had to be 18+ meat consumers who had not taken part in previous studies within this thesis. The experiment was conducted in November 2021 as a voluntary, open survey open to participants who registered for the study via Prolific. After providing informed consent, participants were asked if they recognised tree kangaroos, alongside a photograph of the animal. The study either proceeded using the tree kangaroo as the target animal, or, if participants recognised the tree kangaroo, they were redirected towards the end of the study and did not participate further.

Following initial recognition stage, participants provided demographics and stated their perceived neutrality towards the animal and their initial behavioural self-relevance. Participants then completed the two sections (self-relevance, familiarity) of the pilot study in a randomised order. Here, only the self-relevance section is described (see Section 6.4. for description of the familiarity section). For the self-relevance section, all participants first read the imagined restaurant scenario described in Section 4.5.2.3.2. including reading that the dish contained meat from their target animal. After reading this text, participants again indicated their behavioural self-relevance of the animal (manipulation check) and answered the attention check. Finally, participants had the chance to report technical difficulties and provide any final comments about the study, before being debriefed. Two participants reported technical difficulties, but their responses were complete and maintained within analyses.

4.5.3. Analyses

A one-way (behavioural self-relevance: pre-manipulation vs. post-manipulation) within-subjects ANCOVA, including gender and neutrality as covariates, was conducted on measured behavioural self-relevance, to test if the manipulation effectively manipulates behavioural self-relevance. Gender was again included as a covariate within this ANCOVA. Although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analysis by controlling for and partialling out any relationship between gender and the outcome variable (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and measured behavioural self-relevance (the outcome variable) to be statistically controlled for. Neutrality was also included within analyses as a covariate to account for bias in perceptions of animals. That is, by including neutrality as a covariate, the statistical model is then adjusted to account for this variable, thereby reducing variability and bias in the findings (Keen & Tiemeier, 2022), and increasing power of the analyses by statistically controlling for any possible relationship between neutrality and behavioural self-relevance (Tabachnick & Fidell, 2014).

4.5.3.1. Statistical Assumptions to Test H1: Exploring Effects of Behavioural Self-Relevance Manipulation on Measured Behavioural Self-Relevance (One-Way ANCOVA).

Measured behavioural self-relevance failed normality both pre- and post-manipulation, $p < .05$, but skewness was acceptable. There were no outliers in measured behavioural self-relevance.

4.5.3.2. Testing H1: Exploring Effects of Behavioural Self-Relevance Manipulation on Measured Behavioural Self-Relevance.

A one-way (behavioural self-relevance: pre-manipulation vs. post-manipulation) within-subjects ANCOVA, including gender and neutrality as covariates, was run on measured behavioural self-relevance to test **H1. Supporting H1:** There was a significant main effect of manipulated behavioural self-relevance on measured behavioural self-relevance, $F(1, 127) = 4.9$, $p = .03$, $\eta_p^2 = .04$ (small-sized). That is, the behavioural self-relevance manipulation caused greater measured behavioural self-relevance (M=34.76, SD=28.56) compared to pre-manipulation (M=28.53, SD=27.18).

4.5.4. Discussion and Conclusion

Supporting **H1,** the behavioural self-relevance manipulation now has the expected effect on measured behavioural self-relevance, whereby measured behavioural self-relevance was greater post-manipulation compared to pre-manipulation, meaning that this behavioural self-relevance manipulation has now been found to effectively manipulate behavioural self-relevance. Therefore, informed by these findings, this behavioural self-relevance manipulation is utilised within Study 3 to test causal effects of behavioural self-relevance on pet speciesism. As this manipulation was found to be effective in manipulating behavioural self-relevance here, this manipulation is unchanged within Study 3. However, findings across pilot studies indicate that the previous failed behavioural self-relevance manipulations in Pilot Studies 2a and 3a may have arisen from underpowered analyses and/or issues with the measured behavioural self-relevance manipulation check item (e.g., floor effects). Therefore, measured behavioural self-relevance is again included as a manipulation check in Study 3, but is measured via the willingness version of the item used within the current pilot study rather than the days per week item used within Pilot Studies 2a and 3a.

4.6. Study 3: Applying Self-Relevance to Dogs and Pigs

4.6.1. Introduction and Extension from Studies 1-2 and Pilot Studies

Study 2 found that neither type of self-relevance affected warmth (not aligning with Study 1), competence (in line with Study 1), or active and passive behavioural intentions. However, null effects of behavioural and subjective self-relevance may have arisen from the failure of the behavioural and subjective self-relevance manipulations to manipulate measured behavioural and subjective self-relevance (e.g., Follow-Up/Pilot Study 1).

Following successful amendment of the subjective and behavioural self-relevance manipulations from Pilot Study 2a and 4a respectively, I employ these behavioural and subjective self-relevance manipulations within the current study to again assess if behavioural and subjective self-relevance causally affect warmth, competence, active help, passive help, active harm, and passive harm, to see if results align or not with motivated cognition theory and literature (Gradidge et al., 2021a; Loughnan et al., 2010, 2014; Piazza & Loughnan, 2016; Rothgerber, 2020). That is, to investigate if behavioural and subjective self-relevance motivate negative perceptions of (i.e., lower warmth and competence) and negative behavioural intentions towards (i.e., greater harm and lower help) a self-relevant animal, in line with motivated cognition theory.

The amended behavioural and subjective self-relevance manipulations within the current study are identical to Pilot Study 4a, whereby participants are asked to imagine a restaurant scenario whereby they consume a meat dish, which is either described favourably (subjective self-relevance) or unfavourably (lack of subjective self-relevance) and is later revealed to contain meat from the participant's target animal (manipulation of behavioural self-relevance). Like Study 2, the current study again tests causal effects of behavioural and subjective self-relevance with an unknown target animal (tree kangaroo) in order to enable unmoderated causal effects of behavioural and subjective self-relevance to be determined. Extending beyond Study 2, the current study also tests if the Study 2 null findings apply to dogs and pigs, thereby applying behavioural and subjective self-relevance to pet speciesism specifically.

Due to Study 2 null effects of behavioural and subjective self-relevance, the current study does not make specific hypotheses about effects of behavioural and subjective self-relevance on perceptions of animals (warmth, competence) or behavioural intentions (active help, active harm, passive help, passive harm), whereby warmth, competence, and behavioural intentions are again measured within the current study using the SCM/BIAS map subscales from Sevillano and Fiske (2016b). Instead, the current study represents an exploratory study to elucidate Study 2 results, i.e., to explore if null results are again found with now amended and effective behavioural and subjective self-relevance manipulations (ruling out the explanation of null results arising from ineffective manipulations), or to explore if findings are now instead significant and in line with motivated cognition theory.

Additionally, unlike Study 2, the full motivated cognition model is not tested within the current study (i.e., whether behavioural and subjective self-relevance enhance dissonance, which in turn would be expected to motivate negative perceptions of the self-relevant animal; Gradidge et al., 2021a), as the Dissonance Affect Questionnaire may be measuring general discomfort instead of dissonance. To maintain continuity across studies, I still implement the Dissonance Affect Questionnaire for the current study, but the variable is included for exploratory purposes and is now referred to as 'discomfort' throughout the chapter. As in Study 2, reported weekly meat consumption is included here for exploratory reasons in case of motivated cognition (i.e., deliberate under-reporting of meat consumption to alleviate discomfort; Rothgerber, 2019), and is again measured through a single item asking participants how much meat they consume per week.

Species is mostly included within this study as an exploratory variable. However, previous pet speciesism research (Bilewicz et al., 2011; Caviola & Capraro, 2020; Gradidge et al., 2021b), SCM/BIAS map research (Sevillano & Fiske, 2016a, 2016b, 2019), and Study 1 findings indicate that dogs are viewed more positively than other animals (e.g., pigs), whilst pigs are viewed more negatively than other animals (e.g., dogs). As such, I hypothesise that:

> **H1**: Dogs will be deemed significantly warmer (**a**) and more competent (**b**) than tree kangaroos across self-relevance conditions, who will in turn be deemed significantly warmer and more competent than pigs.

Furthermore, due to evidence of pet speciesism in behavioural intentions towards animals as well as perceptions of them (Gradidge et al., 2021a), alongside active and passive behavioural intentions towards an animal being informed by the animal's perceived warmth and competence (Sevillano & Fiske, 2016; Sevillano & Fiske, 2019), I predict that differences in warmth/competence perceptions of species will extend to behavioural intentions, such that:

> **H2**: Dogs will be subject to significantly more active (**a**) and passive help (**b**), and significantly less active (**c**) and passive harm (**d**), than tree kangaroos across self-relevance conditions, who will in turn be subject to significantly more active and passive help, and significantly less active and passive harm, than pigs.

Finally, as previous BIAS map research both with humans (Cuddy et al., 2007) and with animals (Sevillano & Fiske, 2019) indicates that warmth typically informs active behavioural intentions whilst competence typically informs passive behavioural intentions, I hypothesise that:

> **H3**: Warmth will significantly mediate relationships between species and active help and active harm. That is, dogs will be deemed significantly warmer than tree kangaroos and pigs, significantly increasing active help (**a**) and decreasing active harm (**b**).
>
> **H4**: Competence will significantly mediate relationships between species and passive help and passive harm. That is, dogs will be deemed significantly more competent than tree kangaroos and pigs, significantly increasing passive help (**a**) and decreasing passive harm (**b**).

4.6.2. Methods

4.6.2.1. Participants.

Two-hundred-and-eighty-three participants were recruited via Prolific as a volunteer sample. Quota sampling was partially used through Prolific's 'balance by sex'[16] option to

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[16] Prolific does not provide an option to 'balance by gender'.

obtain approximately equal numbers of men and women. Sixty-eight participants were excluded for: withdrawing their response (*n*=20), stating their culture and/or religion does not typically view dogs as pets and/or pigs as food[17] (*n*=10), recognising the tree kangaroo (*n*=9), participating in a previous experiment (*n*=9), providing partial data (*n*=7), not consuming meat (*n*=5), failing the attention and memory check (*n*=3), or being under 18 (*n*=2). As all analyses included gender as a covariate (see Section 4.6.3. for further discussion), three non-binary participants were excluded to enable gender to be dummy coded into women (coded as zero; *n*=107) and men (coded as one; *n*=108). Exclusions left a sample of 215 participants (50.2% men, 49.8% women; M_{age}=26.27, SD_{age}=8.28, age range=18-65), which exceeded the minimum required sample size of 211 per a G*Power *a priori* power analysis for a MANOVA analysis ('repeated measures, within-between interaction', medium effect size f=.25, six groups, two measurements, α=.05, power = .8). Participants within each condition are shown in Table 7. Demographics of the sample are reported as follows in percentages, with demographic categories which make up less than 2% of the sample being collapsed into 'other'. For nationality: 20.5% (South African), 18.6% (Portuguese), 15.8% (Polish), 6.1% (Italian), 5.6% (Greek), 5.2% (British), 4.7% (Mexican), 2.3% (Dutch), and 21.2% other. For ethnicity: 66.9% (White), 19.1% (Black), 9.1% (mixed), 2.8% (Asian), and 2.1% other. For country of residence (M_{duration}=24.07, SD_{duration}=9.5, range: less than one month to 65 years): 24.2% (South Africa), 17.2% (Portugal), 16.3% (Poland), 7.4% (Italy), 6.1% (United Kingdom), 5.1% (Greece), 4.7% (Mexico), and 19% other. For religion: 50.7% (Christianity), 20.9% (atheism), 15.3% (agnosticism), 7.4% (would rather not say), and 5.7% other.

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[17] These participants were excluded as cultural differences in perceptions of dogs and pigs may impact participant responses (Gradidge et al., 2021a).

Table 7.
Participants Within Each Condition for Study 3.

Species	Subjective Self-Relevance Condition	Number of Participants
Dog	Present	41
Pig	Present	31
Tree Kangaroo	Present	35
Dog	Absent	31
Pig	Absent	37
Tree Kangaroo	Absent	40

4.6.2.2. Design.

This experiment follows a 3(species: tree kangaroo vs. dog vs. pig; between-subjects) x 2(behavioural self-relevance/time: pre- vs. post-manipulation; within-subjects) x 2(subjective self-relevance: present vs. absent; between-subjects) mixed MANCOVA design, with warmth, competence, active help, passive help, active harm, passive harm, reported weekly meat consumption, and post-manipulation discomfort as the DVs. Behavioural and subjective self-relevance were included as DVs to test effectiveness of the manipulations. Gender and neutrality were included as covariates (see Section 4.6.3. for further discussion).

4.6.2.3. Materials.

4.6.2.3.1. Target Animals and Animal Photographs.

As in Study 2, the current study employed the novel animal paradigm. However, the only unknown animal included within this study was the tree kangaroo, with participants within the tree kangaroo condition being asked if they recognised the animal and excluded from the study if so. The current study employed the same photograph of the tree kangaroo as Study 2, whereby this image was sourced from https://www.shutterstock.com/image-photo/close-shot-cute-tree-kangaroo-168261035. Dogs and pigs were also included as target animals to test if behavioural and subjective self-relevance cause pet speciesism specifically. This study therefore implemented individual photographs of a dog and a pig, whereby the animal was directly facing the camera and was included as the central focus of the photograph. These photographs were sourced from https://www.flickr.com/photos/dave_see/8523607444 (dog) and https://www.pexels.com/photo/nature-animals-pig-alp-rona-63285/ (pig). Like Study 2, these photographs were included to enable easier visualisation of the imagined scenario. However, unlike Study 2, these photographs were also used here to ensure participants knew what their target animal was, whilst avoiding informing participants of the name of the species. For instance, the name 'tree kangaroo' may have impacted participants' perceptions of the animal due to the names' association with kangaroos, or because seemingly neutral names influence perceptions of stimuli (Köhler, 1947; Maurer et al., 2006; Ramachandran & Hubbard, 2001). Thus, the current study improved upon Study 2 to further reduce preconceptions and bias by withholding the species name.

4.6.2.3.2. Behavioural and Subjective Self-Relevance Text Manipulations.

As imagined scenarios with animals have previously been utilised to inform perceptions of animals (Auger & Amiot, 2019b), behavioural self-relevance was manipulated via an imagined restaurant scenario, employing images and text developed and successfully piloted by the researcher as described in Pilot Studies 2a, 3a, and 4a (Sections 4.2. to 4.5.), whereby participants imagined consuming a meat dish in a fictional restaurant. Specifically, participants read the following text to set the scene: '*You will now be asked to take part in an imaginary scenario. Please engage with the text and photographs provided. You enter the below restaurant. When inside the restaurant, you are greeted by the waitress in this picture. The waitress takes you to your table below. When sat at your table, you read the menu. After some consideration, you eventually decide on ordering a spaghetti bolognese. After a short wait, your spaghetti bolognese is brought to you and you start to eat.*' Images accompanying this text can be seen in Appendix 6. As the manipulation of subjective self-relevance, participants then read the text: '*Whilst eating the spaghetti bolognese, you remark to yourself* *how flavoursome/flavourless the dish is. The dish is perfectly seasoned/under-seasoned, and the ingredients [do not] blend well',* whereby the text stating that the dish was '*flavoursome'*, '*perfectly seasoned*' and that '*the ingredients blend well*' is the subjective self-relevance condition, and the text stating that the dish was '*flavourless'*, '*under-seasoned*' and that '*the ingredients do not blend well*' is the lack of subjective self-relevance condition. To reveal to participants that the spaghetti bolognese dish actually contained meat from the participants' target animal (i.e., tree kangaroo), as a way to use salience of imagining having consumed the animal as a (pre- vs. post-) manipulation of behavioural self-relevance, participants read the following text: '*After you finish your meal, you go to pay the bill. The waitress asks you if you enjoyed your meal. She then reveals to you that the meat in your spaghetti bolognese came from the species you saw in the first photograph (pictured again below)*'.

4.6.2.3.3. Warmth and Competence (Sevillano & Fiske, 2016b).

Warmth and competence were measured with the same items from Studies 1-2: '*warm*', '*well-intentioned*', '*friendly*' (warmth), and '*competent*', '*skillful*', '*intelligent*' (competence; Sevillano & Fiske, 2016b). However, participants were asked how much they viewed '*the species in the previous photograph*' as possessing these qualities, instead of previous studies where the animals' species name was used, to reduce bias in perceptions of the animal. Items were re-scaled from a five-point Likert scale to a seven-point semantic differential from -3 to 3, with original items (e.g., '*warm*') located at the positive, right side of the scale, and their opposites (e.g., '*cold*') located at the negative, left side. This re-scaling was implemented to incorporate a zero midpoint, and to more easily assess if baseline perceptions of animals are neutral (zero), positive, or negative.

Due to these adaptations, I ran separate PAFAs (Appendices 2c-2d) with direct oblimin rotation to test factorial validity, alongside assessing inter-item correlations to test reliability and communality values to test common variance, on the warmth and competence subscales. The PAFAs revealed adequate loading of all items onto the warmth and competence subscales, pre- and post-manipulation ($\geq .75$), supporting factorial validity, alongside adequate communalities pre- and post-manipulation ($\geq .56$). Additionally, inter-item correlations to assess reliability were adequate for the warmth subscale across timepoints and the competence subscale pre-manipulation, $.6 \leq r\text{s} \leq .79$. At post-manipulation only, inter-item correlations between the first and second competence items, $r=.84$, and the first and third competence items, $r=.83$, were high (whereby high inter-item correlation is $r\text{s} \geq .8$; Field, 2018), whilst the inter-item correlation between the second and third competence items was adequate, $r=.79$. Whilst high inter-item correlations indicate redundancy (i.e., where two items constitute almost identical measurements and are therefore 'redundant'), and cause difficulty with determining how much each item contributes individually to the factor (Field et al., 2012), I decided to retain the first competence item within the competence subscale across timepoints, despite this item's high inter-item correlations, due to adequate inter-item correlations for this item pre-manipulation. Items within each subscale were summed to provide warmth and competence scores. Reliability was adequate within this study for warmth (pre-manipulation $\omega=.83$, 95% BCa CI [.77, .87]; post-manipulation $\omega=.88$, 95% BCa CI [.85, .91]) and competence (pre-manipulation $\omega=.88$, 95% BCa CI [.85, .91]; post-manipulation $\omega=.93$, 95% BCa CI [.9, .95]).

4.6.2.3.4. Behavioural Intentions Towards the Animal (Sevillano & Fiske, 2016b).

Behavioural intentions were measured with the same items from Study 2: '*support'*, '*help'*, '*behave friendly towards'*, '*interact with'* the animal (active help), '*sustain'*, '*conserve'* the animal (passive help), '*kill'*, '*injure'*, '*exterminate'*, '*trap'*, '*reject'* the animal (active harm), and '*let [the animal] die off', 'ignore'* the animal (passive harm; Sevillano & Fiske, 2016b). However, animals were described as '*the species in the previous photograph*' instead of using their species name. These items were re-scaled, akin to the warmth and competence subscales, into a seven-point semantic differential from -3 to 3. Original items (e.g., '*support*') were placed on the positive, right side of the scale, and their opposites (e.g., '*not support*') placed on the negative, left side.

Due to these adaptations, I ran separate PAFAs (Appendices 2e-2f) with direct oblimin rotation to test factorial validity, alongside assessing inter-item correlations to test reliability and communality values to test common variance, on the active help and active harm subscales. As the passive help and passive harm subscales only contain two items, I did not run PAFAs for these subscales.

The PAFAs for the active help and active harm subscales revealed adequate loading of all items onto each subscale, pre- and post-manipulation ($\geq .46$), supporting factorial validity, alongside adequate communalities pre- and post-manipulation for all items in the active help subscale ($\geq .51$) and for items one to four in the active harm subscale ($\geq .41$). Communality was adequate (though not ideal) for the fifth active harm item pre-manipulation (.21) and post-manipulation (.28; Child, 2006). Inter-item correlations to assess reliability were adequate for the active help subscale pre-manipulation, $.53 \leq r\text{s} \leq .62$. At post-manipulation only, the inter-item correlation between the first and second active help items, $r=.81$, was high, whilst all other inter-item correlations were adequate, $.62 \leq r\text{s} \leq .67$. Whilst high inter-item correlations indicate redundancy (i.e., where two items constitute almost identical measurements and are therefore 'redundant'), and cause difficulty with determining how much each item contributes individually to the factor (Field et al., 2012), I retained the first and second active help items within the active help subscale, due to the first and second items' adequate inter-item correlations with other items and their adequate inter-item correlations pre-manipulation. The first four items of the active harm subscale also had adequate inter-item correlations across timepoints, $.44 \leq r\text{s} \leq .68$. Whilst the fifth item in the active harm subscale had an inadequate inter-item correlation with the first item pre-manipulation, r=.28, and post-manipulation, r=.25, this fifth item had adequate inter-item correlations with the three other active harm items across timepoints, $.3 \leq r\text{s} \leq .49$. Therefore, I retained the fifth active harm item within the active harm subscale.

Items within each subscale were therefore summed to provide active help, passive help, active harm, and passive harm scores. Reliability was adequate within this study across timepoints for active help (pre-manipulation ω=.84, 95% BCa CI [.79, .87]; post-manipulation ω=.88, 95% BCa CI [.83, .92]), and active harm (pre-manipulation ω=.82, 95% BCa CI [.74, .87]; post-manipulation ω=.83, 95% BCa CI [.78, .88]). Reliability was also adequate for passive help at post-manipulation (r_{sb}=.73) but was inadequate for passive help at pre-manipulation (r_{sb}=.66) and was inadequate for passive harm at both timepoints (pre-manipulation r_{sb}=.63; post-manipulation r_{sb}=.69). As the passive harm and passive help subscales contain two items, I did not run PAFAs for these subscales, and I was unable to remove an item to improve reliability. Instead, I retained both items in the subscales, and findings using these subscales should be interpreted with caution due to inadequate reliability at one or both timepoints.

4.6.2.3.5. Discomfort (Harmon-Jones, 2000).

Discomfort was measured with the Dissonance Affect Questionnaire from Study 2, whereby items were *'uncomfortable'*, *'uneasy'*, and '*bothered'* (Harmon-Jones, 2000) on a Likert scale from one ('*not at all*') to five ('*extremely*'). Items were summed to create a total discomfort score. Reliability was adequate within this study across timepoints (pre-manipulation ω=.88, 95% BCa CI [.82, .91]; post-manipulation ω=.96, 95% BCa CI [.94, .97]).

4.6.2.3.6. Reported Weekly Meat Consumption.

Reported weekly meat consumption was measured as in Study 2 with the single item developed by the researcher: '*How many days a week do you consume meat?*' from zero to seven days per week.

4.6.2.3.7. Perceived Neutrality Towards the Animal.

Perceived neutrality was included as a covariate to account for bias and preconceptions in perceptions of the target animal. Due to lack of a pre-existing scale to measure perceived neutrality towards the animal, perceived neutrality was measured via a single item developed by the researcher: '*How neutral do you perceive the species in the previous photograph to be?*' on a visual analogue scale from zero to 100. Neutrality was defined as '*By neutral, we mean how non-biased you believe your opinions of the species are. Higher scores mean less bias, whilst lower scores mean more bias*'. A higher score indicates higher neutrality and less bias.

4.6.2.3.8. Behavioural Self-Relevance (Manipulation Check).

As a scale to measure behavioural self-relevance has not yet been created, behavioural self-relevance was measured via the single item developed by the researcher: '*How willing would you be to include meat from this species within your diet?*' on a visual analogue scale from zero to 100, whereby '*this species*' refers to the participants' target animal. This item is identical to that used within Pilot Study 4a, as the amended behavioural self-relevance manipulation was effective in manipulating behavioural self-relevance when measured utilising this item. A higher score indicates greater behavioural self-relevance.

4.6.2.3.9. Subjective Self-Relevance (Manipulation Check).

As a scale to measure subjective self-relevance has not yet been developed, subjective self-relevance was measured via the single item developed by the researcher: '*How much do* *you like the spaghetti bolognese presented in this scenario?*' on a visual analogue from zero to 100. As the amended subjective self-relevance manipulation was effective in manipulating subjective self-relevance when subjective self-relevance was measured utilising this item (Pilot Study 2a), this item was implemented within this study without amendments to measure subjective self-relevance. A higher score indicates greater subjective self-relevance.

4.6.2.3.10. Culture and Religion Questions.

To reduce results being biased by cultural and/or religious differences in how dogs and pigs are traditionally viewed, participants were asked '*Does your main culture and/or religion typically view pigs as food?*' and '*Does your main culture and/or religion typically view dogs as pets?*' in randomised order. Participants could answer '*yes*', '*no*' or '*other*'. Ten participants were excluded for answering '*no*' to at least one question. No participants answered '*other*'.

4.6.2.4. Procedure

Participants were recruited via Prolific (Appendix 7). All participants had to be meat consumers who had not taken part in previous studies within this thesis. The experiment was conducted in November 2021 as a voluntary survey open to participants who registered for the study via Prolific. After providing informed consent, participants provided demographic information, before being randomised into one of three species conditions (tree kangaroo vs. dog vs. pig; 'target animal'). Participants were first presented with a photograph of their target animal. For the tree kangaroo condition, participants were asked if they recognised the animal and, if so, excluded from the experiment. Animal species names were not used during the study. Participants then indicated their perceived neutrality towards their target animal, behavioural self-relevance of the animal, the animal's warmth and competence, behavioural intentions towards the animal, discomfort, and reported weekly meat consumption (all scales and items within scales presented in randomised order).

Participants subsequently read the imagined restaurant scenario, whereby they were randomly allocated into one of the two subjective self-relevance conditions. Participants indicated how much they liked the dish described in the scenario before it was revealed the dish supposedly contained meat from their target animal, accompanied with the target animal's photograph to remind participants of their animal. Following the reveal, participants again rated their behavioural self-relevance towards the target animal, discomfort, reported weekly meat consumption, the animal's warmth and competence, and behavioural intentions towards the animal (all scales and items within scales presented in randomised order), alongside completing an attention and memory check item. Specifically, to assess if participants paid attention to and remembered the imagined restaurant scenario, participants were asked '*What dish did the restaurant scenario refer to?*' [Options: '*spaghetti bolognese*', '*lasagne*', '*salad*', '*noodles*', '*meatballs*']. Three participants did not give the correct answer ('*spaghetti bolognese*'), and so were excluded. Finally, participants indicated if their culture and/or religion typically views dogs as pets and pigs as food, before being debriefed and redirected back to Prolific. One participant reported technical difficulties, but this response was complete and thus maintained within analyses. Participants received £1 via Prolific as reimbursement for full responses. Participants who provided partial data or who recognised the tree kangaroo were reimbursed a proportion of the £1 based either on their percentage of completion (partial data) or time spent completing the survey (recognition), whilst adhering to Prolific's minimum hourly rate.

4.6.3. Analyses

A 3(species: tree kangaroo vs. dog vs. pig) x 2(behavioural self-relevance/time: pre- vs post-manipulation) x 2(subjective self-relevance: present vs. absent) mixed MANCOVA was conducted on warmth, competence, active help, passive help, active harm, passive harm, reported weekly meat consumption, discomfort, and behavioural self-relevance. Warmth, competence, active help, passive help, active harm, and passive harm are all conceptually related (i.e., all from the SCM/BIAS map and subscales of the same overall scales). Additionally, many of these DVs were found to be statistically related through moderate correlations, *r*s ≥ .3. Thus, MANCOVA was deemed appropriate for this analysis.

As subjective self-relevance is nested within behavioural self-relevance and not measured pre-manipulation, a separate 3(species: tree kangaroo vs. dog vs. pig) x 2(subjective self-relevance: present vs. absent) between-subjects ANCOVA was conducted on subjective self-relevance.

Gender was again included as a covariate within the MANCOVA and ANCOVA. Diet was not included as a covariate within this study, as the sample only contained meat consumers. Again, although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analyses by controlling for and partialling out any relationship between gender and the outcome variables (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and warmth/competence perceptions of animals and behavioural intentions towards them (the outcome variables) to be statistically controlled for. Neutrality was also included within analyses as a covariate to account for bias in perceptions of animals. That is, by including neutrality as a covariate, the statistical model is then adjusted to account for this variable, thereby reducing variability and bias in the findings (Keen & Tiemeier, 2022), and increasing power of the analyses by statistically controlling for any possible relationship between neutrality and perceptions of/behavioural intentions towards animals (Tabachnick & Fidell, 2014).

4.6.3.1. Statistical Assumptions to Test H1-H2, Exploratory Analyses and Manipulation Check: Exploring Effects of Behavioural and Subjective Self-Relevance Across Species on SCM/BIAS Map Variables, Meat Consumption, Discomfort, and Measured Behavioural Self-Relevance (3x2x2 MANCOVA)

All DVs failed normality tests, $p < .05$. However, skewness was acceptable for reported meat consumption, passive help, and post-manipulation discomfort. Skewness was also acceptable for warmth and competence across most conditions, except at post-manipulation in the lack of subjective self-relevance condition with the dog as the target animal. Excessive skewness within that condition arose in warmth and competence due to one univariate outlier, and removal of this univariate outlier led to warmth and competence having acceptable skewness across conditions. I therefore maintained warmth and competence within the MANCOVA, and as discussed below, I also ran the MANCOVA including and excluding outliers, which did not alter most multivariate conclusions. Behavioural self-relevance, active harm, and passive harm all had excessive skewness, multiple extreme univariate outliers, and floor effects in the dog conditions, whilst active help had excessive skewness, extreme outliers, and ceiling effects when the dog was the target animal and when there was a lack of subjective self-relevance. Due to excessive skewness, extreme univariate outliers, and floor or ceiling effects in, active harm, passive harm, behavioural self-relevance, and active help, I also ran a MANCOVA excluding active harm, passive harm, behavioural self-relevance, and active help as DVs, which did not change most multivariate conclusions. One conclusion did change, whereby there was no longer a significant behavioural self-relevance and subjective self-relevance interaction on the combined DVs when excluding active harm, passive harm, behavioural self-relevance, and active help as DVs. However, this change likely arose from the exclusion of behavioural self-relevance, as the follow-up ANCOVAs indicate a significant univariate behavioural self-relevance and subjective self-relevance interaction on behavioural self-relevance and no other DVs. I therefore report the MANCOVA including active harm, passive harm, behavioural self-relevance, and active help as DVs.

Besides active harm, passive harm, behavioural self-relevance, and active help, reported meat consumption had no univariate outliers, whilst passive help and discomfort had non-extreme univariate outliers, which did not cause excessive skewness. Warmth and competence had non-extreme univariate outliers which did not cause excessive skewness in all conditions, except the post-manipulation lack of subjective self-relevance condition when the target animal was a dog, whereby one extreme univariate outlier caused excessive skewness in warmth and competence in this condition only. There were multivariate outliers for nine DVs, critical values ≥ 27.88, $p < .001$. Running the MANCOVA including and excluding univariate and multivariate outliers was not possible due to floor effects in active harm, passive harm, and behavioural self-relevance, and ceiling effects in active help. However, running the MANCOVA including and excluding univariate and multivariate outliers without active harm, passive harm, behavioural self-relevance, and active help as DVs indicated only one multivariate conclusion changed (Footnote 19), and I therefore report the MANCOVA including univariate and multivariate outliers.

There was mostly no multicollinearity, with most rs $\leq .85$. However, there was a high correlation between post-manipulation active help and passive harm, r=-.91, in the lack of subjective self-relevance condition with the dog as the target animal, indicating multicollinearity between these DVs within this condition. However, correlations between these variables were acceptable (< .9) pre-manipulation and/or when the target animal was instead a pig or a tree kangaroo, so I maintained both variables separately within the MANCOVA. Linear relationships were present between some DVs across conditions, but not all DVs had linear relationships.

Running follow-up univariate ANCOVAs including and excluding univariate outliers for passive help, discomfort, and warmth did not change conclusions. Excluding univariate outliers changed one major finding for competence (Footnote 21). I report this ANCOVA including outliers to reflect the unamended dataset. Excessive skewness, multiple univariate outliers, and floor or ceiling effects in active harm, passive harm, behavioural self-relevance, and active help meant assumptions for the ANCOVAs on these four DVs were violated. However, I proceeded with these ANCOVAs due to robustness of ANCOVA to non-normality, and lack of non-parametric alternatives. Results from these ANCOVAs should be interpreted with caution.

Most DVs (warmth, pre-manipulation active help, active harm, passive harm, discomfort, reported meat consumption, behavioural self-relevance) failed homogeneity of variances, *p*s < .05. Homogeneity of covariances was not present, $p < .001$.

4.6.3.2. Statistical Assumptions for Manipulation Check: Effect of Subjective Self-Relevance Across Species on Measured Subjective Self-Relevance (3x2 ANCOVA)

Subjective self-relevance failed the normality test, $p < .05$, and subjective self-relevance had outliers and excessive skewness. However, including and excluding outliers for the ANCOVA did not change main conclusions (differing findings reported in Footnote 18). I therefore report the subjective self-relevance ANCOVA including outliers to reflect the unaltered dataset. Homogeneity of variances was not present, $p < .05$.

4.6.3.3. Subjective Self-Relevance Manipulation Check: Effect of Subjective Self-Relevance Across Species on Measured Subjective Self-Relevance[18]

A 3(species: tree kangaroo vs. dog vs. pig) x 2(subjective self-relevance: present vs. absent) between-subjects ANCOVA, including gender and neutrality as covariates, was conducted on subjective self-relevance to test effectiveness of the subjective self-relevance text in manipulating measured subjective self-relevance. A 3x2 between-subjects ANCOVA was used for this manipulation check instead of a one-way (subjective self-relevance: present vs. absent) between-subjects ANCOVA to check consistent effectiveness of the subjective self-relevance manipulation across species conditions (see Table A4 in Appendix 4 for full inferential statistics). The ANCOVA revealed a significant effect of the subjective self-relevance manipulation on measured subjective self-relevance, $F(1, 207) = 261.89, p < .001, \eta_p^2 = .56$ (large-sized), in the expected direction. Specifically, participants demonstrated greater measured subjective self-relevance when subjective self-relevance was present in the manipulation (M=84.2, SD=20.86) than when subjective self-relevance was absent in the manipulation (M=30.2, SD=26.76). Thus, the subjective self-relevance manipulation was effective at manipulating its intended variable of subjective self-relevance. Importantly, there was no significant interaction between the subjective self-relevance manipulation and species on measured subjective self-relevance, $F(2, 207) = 1.48, p = .23, \eta_p^2 = .01$, indicating the subjective self-relevance manipulation is effective across species.

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[18] When excluding outliers, the interaction between the subjective self-relevance manipulation and species on measured subjective self-relevance became significant, $F(2, 191) = 3.64, p = .03, \eta_p^2 = .04$ (small-to-medium-sized). *Post hoc* pairwise comparisons revealed that, when subjective self-relevance was absent only, tree kangaroos were rated with significantly greater measured subjective self-relevance (M=35.06, SE=2.92) than dogs (M=21.31, SE=3.5), $p = .01$, or pigs (M=23.78, SE=3.11), $p = .03$. There were no significant pairwise comparisons when subjective self-relevance was present, ps > .05.

4.6.3.4. Testing H1-H2, Exploratory Analyses and Manipulation Check: Exploring Effects of Behavioural and Subjective Self-Relevance Across Species on SCM/BIAS Map Variables, Meat Consumption, Discomfort, and Measured Behavioural Self-Relevance.

A 3(species: dog vs. pig vs. tree kangaroo) x 2(subjective self-relevance: present vs. absent) x 2(behavioural self-relevance/time: pre- vs. post-manipulation) mixed MANCOVA, including gender and neutrality as covariates, with warmth, competence, active help, passive help, active harm, passive harm, reported meat consumption, post-manipulation discomfort, and behavioural self-relevance as DVs was run to: a) test effectiveness of the behavioural self-relevance text in manipulating measured behavioural self-relevance, b) test **H1-H2**, and c) run exploratory analyses to test causal effects of behavioural and subjective self-relevance on SCM/BIAS map variables**.** Behavioural self-relevance was included in this 3x2x2 mixed MANCOVA instead of a separate one-way (behavioural self-relevance: pre- vs. post-manipulation) within-subjects ANCOVA to check consistent effectiveness of the behavioural self-relevance manipulation across species and subjective self-relevance conditions (see Table A5 in Appendix 4 for full inferential statistics). Descriptive statistics for significant discussed main effects or for *post hoc* pairwise comparisons for significant interaction effects are reported in Tables 8-11.

4.6.3.4.1. Multivariate Effects of Behavioural Self-Relevance, Subjective Self-Relevance and Species on the Combined DVs.[19]

There was a significant two-way interaction between behavioural self-relevance/time and subjective self-relevance on the combined DVs, $F(9, 199) = 1.97$, $p = .045$, $\eta_p^2 = .08$ (medium-sized). There was also a significant two-way interaction between behavioural self-

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[19] Excluding univariate and multivariate outliers with warmth, competence, passive help, reported meat consumption, and post-manipulation discomfort as DVs led to an interaction between species and subjective self-relevance on the combined DVs becoming significant, $F(10, 254) = 2.43$, $p = 01$, $\eta_p 2 = .09$ (medium-sized).

relevance/time and species on the combined DVs, $F(18, 400) = 4.76$, $p < .001$, $\eta_p^2 = .18$ (large-sized), and a significant two-way interaction between behavioural self-relevance/time and gender on the combined DVs, $F(9, 199) = 2.45$, $p = .01$, $\eta_p^2 = .1$ (medium-sized). Beyond interactions, there were significant main effects of behavioural self-relevance/time, $F(9, 199) = 6.05$, $p < .001$, $\eta_p^2 = .22$ (large-sized), species, $F(18, 400) = 13.14$, $p < .001$, $\eta_p^2 = .37$ (large-sized), and gender, $F(9, 199) = 2.96$, $p = .003$, $\eta_p^2 = .12$ (medium-to-large-sized), on the combined DVs. All other multivariate interactions and main effects were non-significant, *p*s > .05. I followed up significant multivariate effects with univariate ANCOVAs on the DVs below.

4.6.3.4.2. Univariate Effects of Behavioural Self-Relevance, Subjective Self-Relevance and Species on Measured Behavioural Self-Relevance (Manipulation Check).

To be deemed effective, the behavioural self-relevance manipulation would be expected to increase measured behavioural self-relevance from pre- to post-manipulation, without differing across species or subjective self-relevance conditions. However, there was an unexpected significant interaction between the behavioural self-relevance manipulation and species on measured behavioural self-relevance, $F(2, 207) = 3.54$, $p = .03$, $\eta_p^2 = .03$ (small-sized), thus indicating effects of the behavioural self-relevance manipulation on measured behavioural self-relevance differ across species. *Post hoc* pairwise comparisons revealed that, for pigs only, measured behavioural self-relevance significantly decreased from pre-manipulation to post-manipulation, $p = .001$, $d = .36$ (small-sized). No such change occurred for dogs, $p = .66$, or tree kangaroos, $p = .18$. Thus, the behavioural self-relevance manipulation was not effective in manipulating measured behavioural self-relevance for dogs or tree kangaroos, and the manipulation affected measured behavioural self-relevance in the opposite direction to that expected for pigs.[20]

Table 8.

Descriptive Statistics for Interaction Effect of Behavioural Self-Relevance and Species on Measured Behavioural Self-Relevance.

Behavioural Self-Relevance Condition	Dog Mean	Dog *SD*	Pig Mean	Pig *SD*	Tree Kangaroo Mean	Tree Kangaroo *SD*
Pre-Manipulation	7.29	17.61	75.87	25.63	27.55	28.58
Post-Manipulation	8.19	19.63	69.1	29.08	24.45	27.5

In addition, there was a significant two-way interaction between the behavioural self-relevance manipulation and the subjective self-relevance manipulation on measured behavioural self-relevance, $F(1, 207) = 12.17$, $p < .001$, $\eta_p^2 = .06$ (medium-sized). *Post hoc* pairwise comparisons showed that measured behavioural self-relevance significantly decreased from pre-manipulation to post-manipulation in the condition whereby subjective self-relevance was absent, $p < .001$, $d = .38$ (small-sized), whilst measured behavioural self-relevance did not change from pre- to post-manipulation in the condition whereby subjective self-relevance was present, $p = .46$. Thus, effects of the behavioural self-relevance manipulation on measured behavioural self-relevance from pre- to post-manipulation differ across subjective self-relevance conditions, whereby measured behavioural self-relevance decreased in the condition without subjective self-relevance and did not change in the condition with subjective self-relevance. These findings therefore indicate the behavioural self-relevance manipulation either had no effect (when subjective self-relevance was present) or had an effect in the opposite direction to predicted, whereby measured behavioural self-relevance decreased after reading the behavioural self-relevance manipulation (when

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[20] There was also a significant main effect of species on measured behavioural self-relevance, $F(2, 207) = 134.66$, $p < .001$, $\eta_p^2 = .57$ (large-sized). However, this effect was qualified by the higher-order two-way interaction between species and behavioural self-relevance as reported in the main text.

subjective self-relevance was absent). These results therefore indicate the behavioural self-relevance manipulation was not effective at manipulating measured behavioural self-relevance.

Beyond the manipulation check, *post hoc* pairwise comparisons for the two-way interaction between the behavioural self-relevance manipulation and subjective self-relevance manipulation also revealed that, post-manipulation only, the condition whereby subjective self-relevance was present (i.e., imagine liking the meat) significantly increased measured behavioural self-relevance compared to the condition whereby subjective self-relevance was absent (i.e., imagine disliking the meat), $p = .03$, $d = .11$ (small-sized). That is, participants were more willing to include meat from the animal within their diets when participants were asked to imagine liking (vs. disliking) the meat dish.

Table 9.
Descriptive Statistics for Interaction Effect of Behavioural Self-Relevance and Subjective Self-Relevance on Measured Behavioural Self-Relevance.

Subjective Self-Relevance Condition	Pre-Manipulation Mean	Pre-Manipulation *SD*	Post-Manipulation Mean	Post-Manipulation *SD*
Present	33.45	38.46	35.2	38.17
Absent	38.62	36.31	31.08	33.92

Whilst there was a significant effect of the behavioural self-relevance manipulation on measured behavioural self-relevance, $F(1, 207) = 4.85$, $p = .03$, $\eta_p^2 = .02$ (small-sized), this effect was in the opposite direction to expected if the manipulation were effective. That is, measured behavioural self-relevance was lower post-manipulation (M=33.13, SD=36.07) than pre-manipulation (M=36.05, SD=37.39). Additionally, the above interactions indicate that the behavioural self-relevance manipulation either a) fails to have any effect on measured behavioural self-relevance (when the target animal is a dog or tree kangaroo, and/or in the condition whereby subjective self-relevance is present), or b) unexpectedly decreases measured behavioural self-relevance from pre- to post-manipulation (when the target animal is a pig, and/or in the condition whereby subjective self-relevance is absent).

4.6.3.4.3. H1a: Univariate Effects of Behavioural Self-Relevance, Subjective Self-Relevance and Species on Warmth.

There was no significant interaction between behavioural self-relevance/time and subjective self-relevance on warmth, $F(1, 207) = 1.95, p = .16, \eta_p^2 = .01$. The behavioural self-relevance manipulation also had no significant main effect on warmth, $F(1, 207) = .34, p = .56, \eta_p^2 = .002$. **Partially consistent with H1a:** There was a significant main effect of species on warmth, $F(2, 207) = 34, p < .001, \eta_p^2 = .25$ (large-sized). *Post hoc* pairwise comparisons revealed dogs were deemed significantly warmer than pigs, $d = 1.21$ (large-sized), and tree kangaroos $d = 1.19$ (large-sized), *p*s < .001. However, **partially not supporting H1a**, there was no significant difference between pigs' and tree kangaroos' warmth, $p = 1$.

4.6.3.4.4. H1b: Univariate Effects of Behavioural Self-Relevance, Subjective Self-Relevance and Species on Competence.[21]

In line with Studies 1-2, there were no significant effects of the behavioural self-relevance manipulation, $F(1, 207) = .42, p = .52, \eta_p^2 = .002$, or the subjective self-relevance manipulation interacting with behavioural self-relevance/time, $F(1, 207) = 1.59, p = .21, \eta_p^2 = .01$, on competence. **Aligning with H1b:** Species had a significant main effect across timepoints on competence, $F(2, 207) = 27.54, p < .001, \eta_p^2 = .21$ (large-sized). *Post hoc* pairwise comparisons revealed dogs were deemed significantly more competent than tree kangaroos, $d = .82$ (large-sized), and pigs, $d = 1.24$ (large-sized), *p*s < .001. Additionally, tree

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[21] When excluding univariate outliers, the behavioural self-relevance manipulation had a significant main effect on competence, $F(1, 203) = 3.99, p = .47, \eta_p^2 = .02$ (small-sized): Animals were deemed more competent post-manipulation (M=3.65, SD=3.96) than pre-manipulation (M=3.29, SD=3.83).

kangaroos were deemed significantly more competent than pigs, $p = .04$, $d = .42$ (small-sized). There was also a significant main effect of gender on competence, $F(1, 207) = 8.98$, $p = .003$, $\eta_p^2 = .04$ (small-sized), whereby women viewed animals as significantly more competent than men did pre-manipulation, $B = -1.45$, $SE = .49$, $p = .004$, and post-manipulation, $B = -1.49$, $SE = .52$, $p = .005$.

4.6.3.4.5. H2a: Univariate Effects of Behavioural Self-Relevance, Subjective Self-Relevance and Species on Active Help.

There were no significant effects of the behavioural self-relevance manipulation, $F(1, 207) = .06$, $p = .8$, $\eta_p^2 < .001$, or the subjective self-relevance manipulation interacting with behavioural self-relevance/time, $F(1, 207) = 2.83$, $p = .09$, $\eta_p^2 = .01$, on active help. **Partially agreeing with H2a:** There was a significant effect of species on active help, $F(2, 207) = 19{,}48$, $p < .001$, $\eta_p^2 = .16$ (large-sized). *Post hoc* pairwise comparisons show people are significantly more willing to actively help dogs than pigs, $d = .95$ (large-sized), or tree kangaroos, $d = .86$ (large-sized), *p*s < .001. **Partially not supporting H2a:** There was no significant difference in active help for pigs and tree kangaroos, $p = 1$.

4.6.3.4.6. H2b: Univariate Effects of Behavioural Self-Relevance, Subjective Self-Relevance and Species on Passive Help.

In line with Study 2, there was no significant effects of the behavioural self-relevance manipulation, $F(1, 207) = .71$, $p = .4$, $\eta_p^2 = .003$, or the subjective self-relevance manipulation interacting with behavioural self-relevance/time, $F(1, 207) = .78$, $p = .38$, $\eta_p^2 = .004$, on passive help. **Partially consistent with H2b:** There was a significant effect of species on passive help, $F(2, 207) = 7.11$, $p = .001$, $\eta_p^2 = .06$ (medium-sized). *Post hoc* pairwise comparisons show people are significantly more willing to passively help dogs than pigs, $d = .59$ (medium-sized), $p =.002$, or tree kangaroos, $d = .51$ (medium-sized), $p = .01$.

Partially not supporting H2b: There was no significant difference in passive help for pigs and tree kangaroos, $p = 1$.

4.6.3.4.7. H2c: Univariate Effects of Behavioural Self-Relevance, Subjective Self-Relevance and Species on Active Harm.

There were no significant effects of the behavioural self-relevance manipulation, $F(1, 207) = .14$, $p = .71$, $\eta_p^2 = .001$, or the subjective self-relevance manipulation interacting with behavioural self-relevance/time, $F(1, 207) = .46$, $p = .5$, $\eta_p^2 = .002$, on active harm. **Agreeing with H2c:** There was a significant effect of species on active harm, $F(2, 207) = 31.12$, $p < .001$, $\eta_p^2 = .23$ (large-sized). *Post hoc* pairwise comparisons show people are significantly less willing to actively harm dogs than to harm pigs, $d = 1.34$ (large-sized), or tree kangaroos, $d = .65$ (medium-sized), ps <.001. People are also significantly more willing to actively harm pigs than to harm tree kangaroos, $d = .7$ (medium-sized), $p < .001$.

4.6.3.4.8. H2d: Univariate Effects of Behavioural Self-Relevance, Subjective Self-Relevance and Species on Passive Harm.

In line with Study 2, there was no significant interaction between the subjective self-relevance manipulation and behavioural self-relevance/time on passive harm, $F(1, 207) = .01$, $p = .94$, $\eta_p^2 < .001$. However, the behavioural self-relevance manipulation did have a significant main effect on passive harm, $F(1, 207) = 5.16$, $p = .02$, $\eta_p^2 = .02$ (small-sized). That is, passive harm was lower post-manipulation (M=-3.84, SD=2.6) than pre-manipulation (M=-3.37, SD=2.74). **Agreeing with H2d:** There was a significant effect of species on passive harm, $F(2, 207) = 25.46$, $p < .001$, $\eta_p^2 = .2$ (large-sized). *Post hoc* pairwise comparisons show people are significantly less willing to passively harm dogs than pigs, $d = 1.2$ (large-sized), or tree kangaroos, $d = .74$ (medium-sized), ps <.001. People are also significantly more willing to passively harm pigs than to harm tree kangaroos, $d = .47$ (small-sized), $p = .02$. There was also a significant interaction between behavioural self-relevance/time and gender on passive harm, *F*(1, 207) = 3.97, *p* = .048, η_p^2 = .02 (small-sized), whereby, post-manipulation only, men were significantly more willing to passively harm animals than women were, *B* = .86, *SE* = .32, *p* = .01. This effect was not significant pre-manipulation, *B* = .36, *SE* = .34, *p* = .29.

Table 10.
Descriptive Statistics for Effect of Species on Warmth, Competence, Active Help, Active Harm, Passive Help, Passive Harm.

DV	Dog Mean	Dog *SE*	Pig Mean	Pig *SE*	Tree Kangaroo Mean	Tree Kangaroo *SE*
Warmth	7.21	.38	3.32	.39	3.38	.37
Competence	5.72	.43	1.28	.43	2.77	.41
Active Help	9.31	.54	4.97	.55	5.38	.52
Active Harm	-13.71	.52	-7.85	.53	-10.87	.5
Passive Help	3.76	.32	2.16	.33	2.38	.31
Passive Harm	-5.04	.27	-2.34	.27	-3.39	.26

4.6.3.4.9. Univariate Effects of Behavioural Self-Relevance, Subjective Self-Relevance and Species on Reported Weekly Meat Consumption.

There were no significant effects on reported weekly meat consumption (see Table A5 in Appendix 4). There was therefore no evidence for under-reporting across behavioural self-relevance, subjective self-relevance, or species conditions.

4.6.3.4.10. Univariate Effects of Behavioural Self-Relevance, Subjective Self-Relevance and Species on Discomfort.

There was a significant two-way interaction between behavioural self-relevance/time and species on discomfort, *F*(2, 207) = 38.28, *p* < .001, η_p^2 = .27 (large-sized). *Post hoc* pairwise comparisons indicate participants felt significantly greater discomfort post-manipulation when the scenario involved a dog, *d* = 1.45 (large-sized), or tree kangaroo, *d* = .96 (large-sized), compared to pre-manipulation, *p*s < .001. When the scenario involved a pig, discomfort did not significantly differ from pre-manipulation to post-manipulation, *p* = .3.

The subjective self-relevance manipulation did not significantly interact with behavioural self-relevance/time, $F(1, 207) = .81$, $p = .37$, $\eta_p^2 = .004$, on discomfort. The behavioural self-relevance manipulation also had a significant interaction with gender on discomfort, $F(1, 207) = 13.66$, $p < .001$, $\eta_p^2 = .06$ (medium-sized), whereby women felt more discomfort than men pre-manipulation, $B = -.75$, $SE = .35$, $p = .03$, and post-manipulation, $B = -2.37$, $SE = .47$, $p < .001$.

Table 11.
Descriptive Statistics for Interaction Effect of Behavioural Self-Relevance and Species on Discomfort.

Behavioural Self-Relevance Condition	Dog Mean	Dog *SD*	Pig Mean	Pig *SD*	Tree Kangaroo Mean	Tree Kangaroo *SD*
Pre-Manipulation	5.13	.31	4.97	.31	4.88	.3
Post-Manipulation	10.28	.41	5.37	.41	7.77	.39

4.6.3.5. Testing H3-H4: Exploring Mediational Relationships Between Species and Active and Passive Behavioural Intentions Through Warmth/Competence

Per the BIAS map, I predicted warmth would mediate the relationship between species and active help (**H3a**) and active harm (**H3b**), and that competence would mediate the relationship between species and passive help (**H4a**) and passive harm (**H4b**), across timepoints. To test **H3-H4**, I used indicator coding due to the multi-categorical IV of species (Hayes & Preacher, 2014), creating two dummy variables for species (X1 and X2). Dog was utilised as the reference category (zero), whilst pig was coded as one on X1 and zero on X2, and tree kangaroo was coded as one on X2 and zero on X1. Thus, X1 represents comparisons between pigs (one) vs. non-pigs (zero), whilst X2 represents comparisons between tree kangaroos (one) vs. non-tree kangaroos (zero). Eight individual boot-strapped mediation analyses (10,000 bootstrap samples) were run using Model 4 in PROCESS through SPSS (Hayes, 2022) to assess mediational relationships for the four behavioural intentions pre- and post-manipulation. To control for Type I error from multiple mediation testing, I utilised an adjusted confidence interval of 99%. Significant mediations are interpreted through confidence intervals which do not contain zero per Hayes (2018).

As warmth and competence were significantly correlated with each other at both timepoints within the current study as revealed through Pearson correlations, pre-manipulation $r = .61$, $p < .001$, post-manipulation $r = .71$, $p < .001$, and warmth and competence are conceptually related, warmth and competence were included as parallel mediators within the below mediation analyses. Inclusion of warmth and competence as parallel mediators allows for testing of any mediational roles of warmth for active behavioural intentions *whilst* controlling for competence, and any mediational roles of competence for passive behavioural intentions *whilst* controlling for warmth (Hayes, 2018).

4.6.3.5.1. H3a: Mediation of Species on Active Help through Warmth.

Agreeing with H3a: There were significant indirect effects of species both on pre-manipulation active help through pre-manipulation warmth when controlling for pre-manipulation competence, and on post-manipulation active help through post-manipulation warmth when controlling for post-manipulation competence. Thus, warmth significantly mediated the relationship between species and active help across timepoints (Figures 2-3). The model explained 45.1% ($R^2 = .451$) and 54% ($R^2 = .54$) of variance in active help pre-manipulation and post-manipulation respectively. Additionally, inspection of path b indicated greater warmth significantly predicted greater active help across timepoints (Figures 2-3).

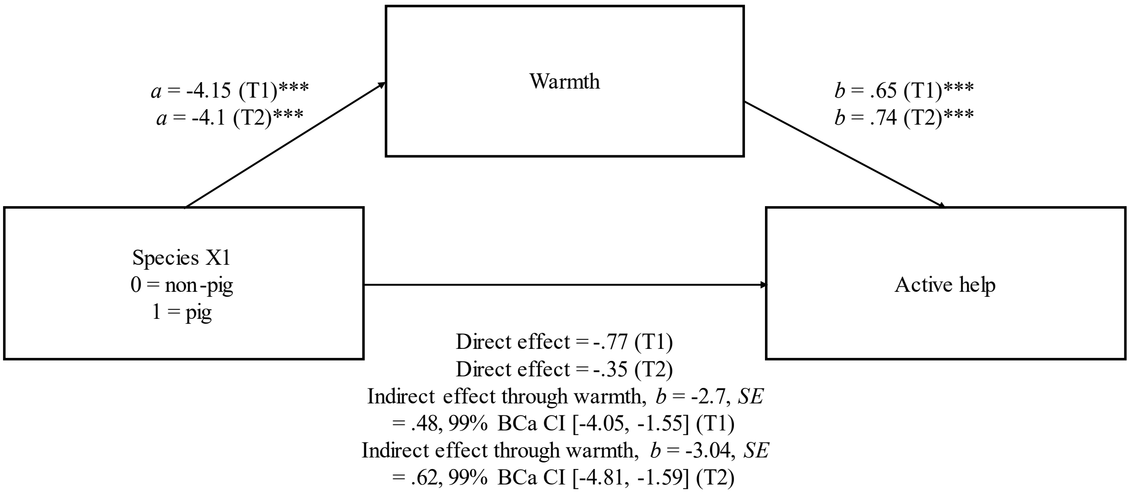


Figure 2. Pre- and post-manipulation mediational models of the species X1 variable (pig vs. non-pig) on active help through warmth when controlling for competence. *Note:* T1 refers to pre-manipulation and T2 refers to post-manipulation. Standard error is reported for indirect effects only. ***p<.001

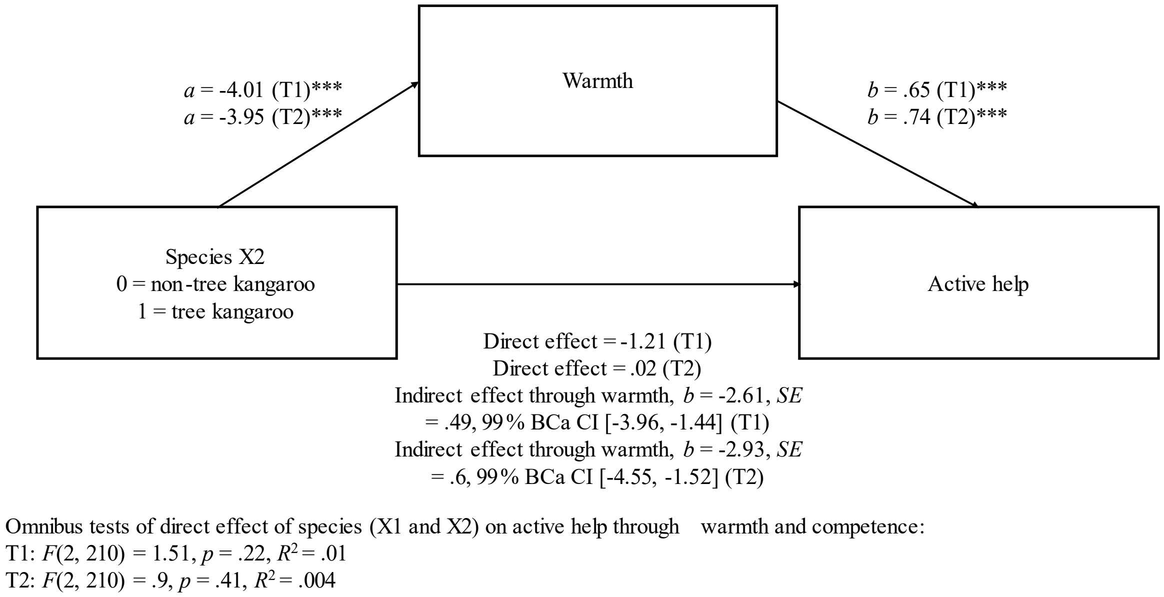


Figure 3. Pre- and post-manipulation mediational models of the species X2 variable (tree kangaroo vs. non-tree kangaroo) on active help through warmth when controlling for competence. *Note:* T1 refers to pre-manipulation and T2 refers to post-manipulation. Standard error is reported for indirect effects only. Statistics for the omnibus test of the overall direct effects of species (X1 and X2 combined) on active help through warmth and competence are reported beneath the figure.***$p<.001$

4.6.3.5.2. H3b: Mediation of Species on Active Harm through Warmth.

Agreeing with H3b: There were significant indirect effects of species both on pre-manipulation active harm through pre-manipulation warmth when controlling for pre-manipulation competence, and on post-manipulation active harm through post-manipulation warmth when controlling for post-manipulation competence. Thus, warmth significantly mediated the relationship between species and active harm across timepoints (Figures 4-5). The model explained 35.8% ($R^2 = .358$) and 41.3% ($R^2 = .413$) of variance in active harm pre-manipulation and post-manipulation respectively. Additionally, inspection of path *b* indicated greater warmth significantly predicted less active harm across timepoints (Figures 4-5).

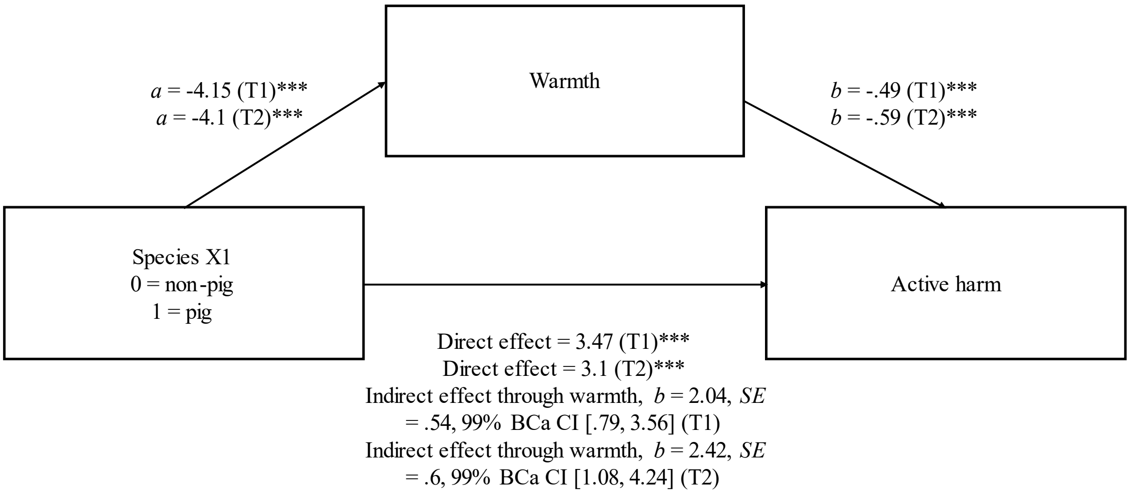
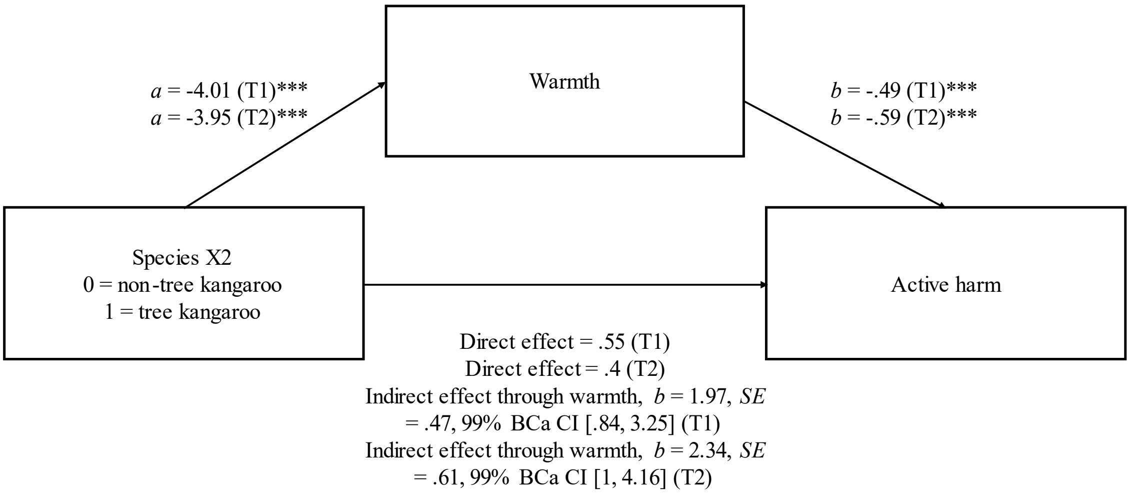


Figure 4. Pre- and post-manipulation mediational models of the species X1 variable (pig vs. non-pig) on active harm through warmth when controlling for competence. *Note:* T1 refers to pre-manipulation and T2 refers to post-manipulation. Standard error is reported for indirect effects only. ***p<.001



Omnibus tests of direct effect of species (X1 and X2) on active harm through warmth and competence:
T1: $F(2, 210) = 11.98$, $p < .001$, $R^2 = .07$
T2: $F(2, 210) = 10.63$, $p < .001$, $R^2 = .06$

Figure 5. Pre- and post-manipulation mediational models of the species X2 variable (tree kangaroo vs. non-tree kangaroo) on active harm through warmth when controlling for competence. *Note:* T1 refers to pre-manipulation and T2 refers to post-manipulation. Standard error is reported for indirect effects only. Statistics for the omnibus test of the overall direct effects of species (X1 and X2 combined) on active harm through warmth and competence are reported beneath the figure. ***$p<.001$

4.6.3.5.3. H4a: Mediation of Species on Passive Help through Competence.

Partially consistent with H4a: There was a significant indirect effect of species on pre-manipulation passive help through pre-manipulation competence when controlling for pre-manipulation warmth (Figures 6-7). However, **not supporting H4a,** the indirect effect of species on post-manipulation passive help through post-manipulation competence when controlling for post-manipulation warmth was not significant (Figures 6-7). Thus, competence significantly mediated the relationship between species and passive help pre-manipulation, yet not post-manipulation (Figures 6-7). The model explained 20.2% ($R^2 =$

.202) of variance in pre-manipulation passive help. Inspection of path *b* indicated greater competence significantly predicted greater passive help pre-manipulation, yet not post-manipulation (Figures 6-7).

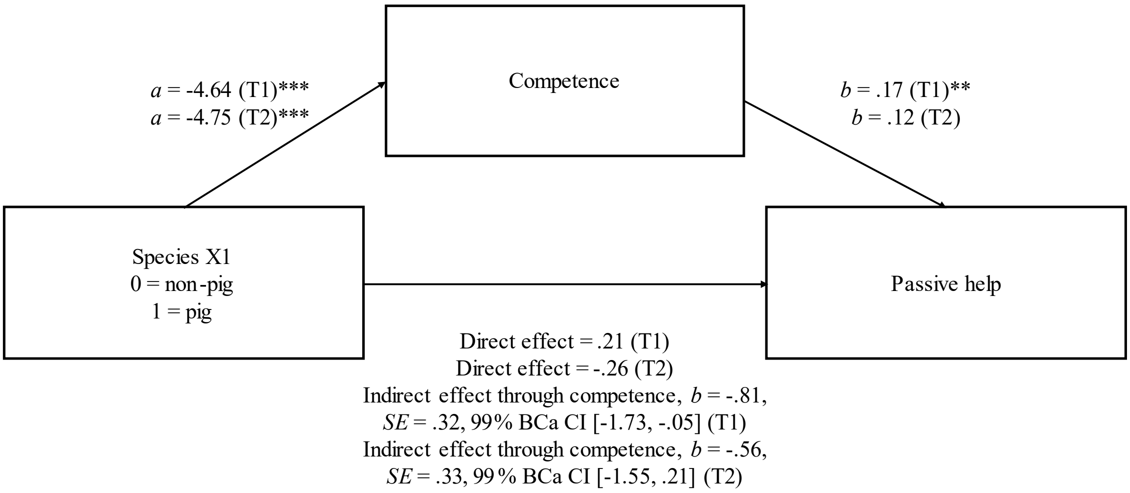


Figure 6. Pre- and post-manipulation mediational models of the species X1 variable (pig vs. non-pig) on passive help through competence when controlling for warmth. *Note:* T1 refers to pre-manipulation and T2 refers to post-manipulation. Standard error is reported for indirect effects only. ***p<.001, **p≤.01

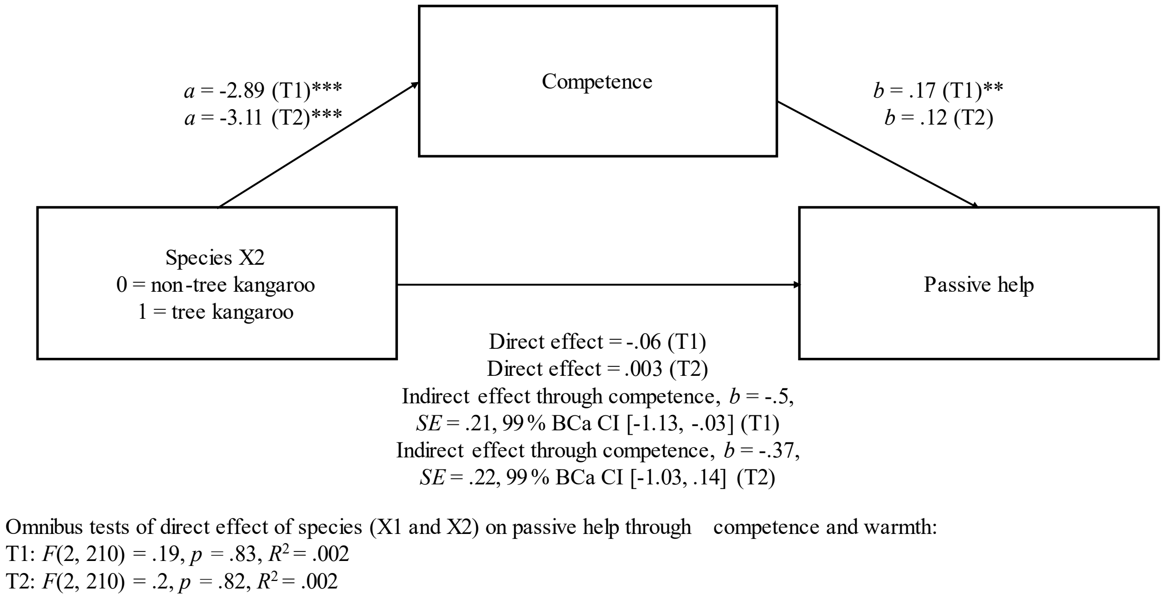


Figure 7. Pre- and post-manipulation mediational models of the species X2 variable (tree kangaroo vs. non-tree kangaroo) on passive help through competence when controlling for warmth. *Note:* T1 refers to pre-manipulation and T2 refers to post-manipulation. Standard error is reported for indirect effects only. Statistics for the omnibus test of the overall direct effects of species (X1 and X2 combined) on passive help through competence and warmth are reported beneath the figure. ***$p<.001$, **$p\leq.01$

4.6.3.5.4. H4b: Mediation of Species on Passive Harm through Competence.

Not supporting H4b: There were no significant indirect effects of species on passive harm through competence when controlling for warmth, either pre-manipulation for X1, $b = .3$, $SE = .24$, 99% CI [-.25, .99], or X2, $b = .19$, $SE = .15$, 99% CI [-.16, .6], or post-manipulation for X1, $b = .56$, $SE = .28$, 99% CI [-.14, 1.37], or X2, $b = .37$, $SE = .18$, 99% CI [-.09, .9]. Thus, competence did not significantly mediate the relationship between species and passive harm at either timepoint. Additionally, inspection of path *b* indicated that greater competence significantly predicted less passive harm post-manipulation, $b = -.12$, $SE = .05$, *p*

= .01, 99% CI [-.24, .001], but not pre-manipulation, $b = -.07$, $SE = .05$, $p = .17$, 99% CI [-.19, .06].

4.6.4. Discussion

4.6.4.1. Discussion of Findings.

4.6.4.1.1. H1-H2: Effects of Species on SCM/BIAS Map Variables (Evidence for Pet Speciesism).

Mostly supporting **H1-H2** and previous pet speciesism literature (Bilewicz et al., 2011; Caviola & Capraro, 2020; Gradidge et al., 2021b; Sevillano & Fiske, 2016b), dogs were deemed warmer and more competent than pigs and tree kangaroos (large-sized) and were subject to greater active help (large-sized), greater passive help (medium-sized), and less active and passive harm (medium- or large-sized) than the other animals. Additionally, supporting **H1-H2**, tree kangaroos were deemed more competent (small-sized) and subject to less active harm (medium-sized) and less passive harm (small-sized) than pigs. However, not supporting **H1-H2** and previous literature (Sevillano & Fiske, 2016b), there were no significant differences between pigs' and tree kangaroos' warmth nor active and passive help towards the animals. Most of these findings align with or are larger than previously found medium-sized effects of species on other perceptions of animals (Gradidge et al., 2021b), although the small-sized effects may have lower practical significance. Additionally, the passive harm and passive help findings should be interpreted with caution due to inadequate reliability.

Combined, the across-species findings suggest an overarching preference for dogs across various perceptions and behavioural intentions, and this preference applies over 'food' animals like pigs and unknown animals like tree kangaroos. Thus, pet speciesism may be partly motivated by prejudice in favour of dogs across all dimensions. Pet speciesism may also be motivated by prejudice against 'food' animals like pigs, at least in the domains of competence, active harm, and passive harm. Indeed, people can deny and/or disregard the cognitive capacities of 'food' animals like pigs (Bastian et al., 2012a; Bilewicz et al., 2011), whereas people do not deny and/or disregard these capacities in unfamiliar, fictional, or non-'food' animals (Higgs et al., 2020; Piazza & Loughnan, 2016). Thus, these previous findings regarding denial and/or disregarding of 'food' animals' cognitive capacities could explain why pigs were viewed within this study as less competent than tree kangaroos. This difference in tree kangaroos' and pigs' competence may in turn explain the differences in passive harm towards the two species found here. For example, people are more willing to passively harm 'prey' animals like pigs (due to these animals' lower competence) than animals deemed more competent (Sevillano & Fiske, 2016b). Thus, as tree kangaroos were deemed more competent than pigs within this study, this greater competence may explain why participants showed less passive harm towards tree kangaroos than towards pigs. However, although competence typically informs passive harm and passive help, there was no differences in passive help towards tree kangaroos and pigs. This finding therefore demonstrates occasional separability of perceptions of animals per the SCM (e.g., competence) and behavioural intentions per the BIAS map (e.g., passive help).

The lack of difference between tree kangaroos' and pigs' warmth may not support previous research, whereby people typically deny the positive qualities of typical 'food' animals like pigs (Bastian et al., 2012a; see Gradidge et al., 2021a). Thus, pigs, as typical 'food' animals, would be expected to be deemed less warm than non-'food' animals like tree kangaroos. However, Sevillano and Fiske (2016b) found that pigs and other 'food' animals ('prey' animals per Sevillano & Fiske, 2016b) were still deemed moderately high in warmth, although not as high in warmth as companion animals like dogs. Thus, as perceptions of tree kangaroos have not been tested before, tree kangaroos (and other unknown animals) may fall closer to the 'prey' (vs. 'companion') cluster on the warmth dimension. Participants also did not differ in their active help towards tree kangaroos and pigs. Whilst a lack of differences between tree kangaroos and pigs on warmth and active help was unexpected, and does not support **H1-H2**, these null effects are at least in line with each other and the BIAS map, whereby warmth informs active help (Cuddy et al., 2007). That is, as tree kangaroos and pigs did not differ on warmth, it is in line with the BIAS map that tree kangaroos and pigs also did not differ on active help.

Conversely, tree kangaroos and pigs did differ on active harm. Thus, this finding again demonstrates occasional possible separability of perceptions of animals per the SCM (e.g., warmth) and behavioural intentions per the BIAS map (e.g., active harm). Whilst not yet explicitly tested, this finding may again be due to pigs' status as 'food', whereby people may be more willing to actively harm animals that are already harmed through food production than to harm animals which are not already being harmed.

4.6.4.1.2. Effects of Behavioural and Subjective Self-Relevance on SCM/BIAS Map Variables.

The current study found mostly null effects of self-relevance on perceptions of, and behavioural intentions towards, animals. Such null effects were expected for competence and passive help, whilst a null effect of subjective self-relevance on passive harm was also expected. These findings are consistent with Study 2 and the BIAS map, whereby greater competence informs greater passive help and less passive harm. That is, lack of an effect of behavioural and subjective self-relevance on competence and its associated passive behavioural intentions (passive help, passive harm) is consistent with the BIAS map. However, standing in contrast to the BIAS map, there was an unexpected significant small-sized effect of behavioural self-relevance on passive harm, whereby passive harm was lower after (vs. before) the manipulation (although this passive harm finding should be interpreted with caution due to floor effects and inadequate scale reliability). In other words, after participants had imagined consuming meat from the animal (compared to before), they were less likely to want to passively harm the animal, regardless of whether they liked the meat or which species the meat came from. As behavioural self-relevance was measured within this study as a within-subjects variable from pre- to post-manipulation, and due to the nature of the passive harm items (‘*ignore*’, ‘*let them die off*’), the reduction in passive harm may be arising simply from reading more information about the animal, rather than due to salience of behavioural self-relevance specifically. That is, participants may be less willing to ‘*ignore*’ the animal after reading the behavioural self-relevance manipulation simply because the manipulation made the animal salient, and less willing to ‘*let [the animal] die off*’ as the animal’s possible role in food production is salient. Therefore, participants may be more invested in stopping the species from becoming extinct due to the species’ utility for food production.

Whilst there was this significant effect of behavioural self-relevance on passive harm, this finding was in the opposite direction to expected, which is contradictory to previous motivated cognition literature, whereby behavioural self-relevance would theoretically increase harm (Loughnan et al., 2014; Piazza & Loughnan, 2016). However, this finding does agree with Study 2, whereby passive harm also reduced from pre- to post-manipulation. This effect was small-sized across Studies 2-3, so may have lower practical significance.

In line with Study 2, behavioural and subjective self-relevance did not affect warmth, active help, or active harm (although the active harm and active help ANCOVAs should be interpreted with caution due to floor and ceiling effects respectively). Lack of relationships between behavioural and subjective self-relevance and warmth contrast to Study 1 and may not support previous literature on self-relevance and motivated cognition (Gradidge et al., 2021a; Loughnan et al., 2010, 2014; Piazza & Loughnan, 2016; Rothgerber, 2020), which would expect people to view animals as less warm when they are behaviourally and/or subjectively self-relevant (due to motivated cognition). However, Studies 2-3 provide no evidence for these hypothesised effects of behavioural and subjective self-relevance, and instead may indicate that behavioural and subjective self-relevance, as manipulated and measured across Studies 2-3, do not cause pet speciesism.

4.6.4.1.3. H3-H4: Mediational Relationships Between Species, Warmth/Competence and Active and Passive Behavioural Intentions.

The mediation hypothesis for warmth (**H3**) was supported, whereby warmth significantly mediated relationships between species and active help and active harm. That is, the animal being a pig or a tree kangaroo (vs. not) decreased the animals' warmth, which in turn decreased active help and increased active harm. However, mediation hypotheses for competence (**H4**) were mostly not supported. Specifically, pre-manipulation competence significantly mediated the relationship between species and pre-manipulation passive help, but competence did not significantly mediate relationships between species and post-manipulation passive help, nor between species and passive harm across timepoints. Therefore, the animal being a pig or a tree kangaroo (vs. not) decreased the animals' pre-manipulation competence, which in turn decreased pre-manipulation passive help, but this finding did not extend to post-manipulation passive help nor to passive harm across timepoints. As dogs were included as the reference category for these mediation analyses, mediational findings are not presented for perceptions of dogs. The current mediational findings fully corroborate the BIAS map as applied to animals for warmth (Sevillano & Fiske, 2016), as warmth predicted greater active help and lower active harm across timepoints, but not always for competence, as competence predicted greater passive help only at pre-manipulation (with no significant relationship post-manipulation) and lower passive harm only at post-manipulation (with no significant relationship pre-manipulation).

4.6.4.1.4. Effects of Behavioural Self-Relevance, Subjective Self-Relevance and Species on Reported Meat Consumption.

Not supporting prior research (Rothgerber, 2019), but in line with Study 2, there was no evidence for motivated under-reporting of meat consumption within any behavioural and subjective self-relevance or species condition. However, under-reporting present across all conditions could not be investigated within this study due to lack of implicit meat consumption measures (e.g., food diaries; Gradidge et al., 2021a) to corroborate the explicit meat consumption measure used here. Instead, future research should compare reported meat consumption with actual meat consumption (e.g., through food diaries) to detect under-reporting.

4.6.4.1.5. Effect of Behavioural Self-Relevance on Discomfort.

There was a significant large-sized effect of behavioural self-relevance on discomfort differing across species, with participants feeling greater discomfort post-manipulation (vs. pre-manipulation) after exposure to dogs and tree kangaroos, but not pigs. This species difference may arise from normalisation of pigs as food and hence no discomfort due to the everyday reality and accessibility of pig meat, unlike the lack of normalisation of dogs and tree kangaroos as food with the current sample.

4.6.4.2. Limitations of the Current Study and Directions for Future Research.

The current study has some limitations to be addressed in future research: a) assumed neutrality of the tree kangaroo, and b) lack of testing of the full motivated cognition model.

Firstly, drawing on the ‘novel animal paradigm’, the study assumes neutrality of the ‘unknown’ animal (the tree kangaroo), whereby the tree kangaroo would be deemed less positive than dogs and more positive than pigs. However, bias was not explicitly tested within the current study beyond a self-report neutrality item, which may itself be subject to self-report bias. Whilst efforts to reduce confounding variables and bias were implemented (e.g., the tree kangaroo matching dogs and pigs on evident characteristics like being a mammal, withholding the species name, and including neutrality as a covariate within analyses), participants may still have been biased by the photograph of the animal, or may even be more broadly biased in their perceptions of unknown mammalian animals. For example, one-tailed one-sample *t*-tests on the current data indicate all animals, even the tree kangaroo, were deemed significantly warmer and more competent than zero, *p*s < .05. Participants were also significantly more willing to actively and passively help, and less willing to actively and passively harm, all animals compared to zero, *p*s < .05. These effects were all present pre-manipulation. These biased preconceptions of the animals, even the 'neutral' tree kangaroo, mean unmoderated and unbiased causal effects of behavioural and subjective self-relevance on perceptions of and behavioural intentions towards animals are difficult to assess. Future research will therefore need to directly account for and include (implicit) bias as a covariate within analyses, such as through an Implicit Association Test, whereby photographs of different animals have to be paired with 'good' vs. 'bad' descriptors.

A second limitation of the current study is its lack of testing of the full motivated cognition model due to inadequate measures of dissonance. Valid and reliable measures must be developed to measure meat-related dissonance and other motivated cognition variables, like moral engagement (Gradidge et al., 2021a). These measures would ideally measure dissonance and moral engagement implicitly to avoid biased self-report. For example, the current study assumes positive perceptions of animals as a proxy for moral engagement, whereby greater warmth indicates moral engagement, and lower warmth indicates moral disengagement. However, moral engagement was not measured directly, so these assumptions cannot be explicitly tested. Whilst a reliable and valid 'Moral Disengagement in Meat Questionnaire' has been developed (Graça et al., 2016), future research should aim to develop an equivalent ‘Moral Engagement in Meat’ scale to aid full testing of the motivated cognition model. Future research could also measure dissonance with alternative measures that are not vulnerable to issues with self-report, like skin conductance response (Harmon-Jones et al., 1996), and brain imaging (Izuma et al., 2010; Izuma & Murayama, 2019).

4.6.4.3. Conclusion for the Current Study.

To summarise, the current study mostly corroborates previous pet speciesism literature by finding that dogs are perceived as warmer and more competent than pigs and tree kangaroos, and subject to more positive behavioural intentions. However, participants unexpectedly did not view tree kangaroos and pigs as differing on warmth, and participants did not differ in active and passive help towards tree kangaroos and pigs. The current study also found null effects of behavioural and subjective self-relevance on warmth, competence, active help, active harm, and passive help, alongside an unexpected effect of behavioural self-relevance on passive harm for all animals, not supporting previous self-relevance literature.

Finally, the study replicated applicability of the SCM/BIAS map across species for warmth, as demonstrated by significant mediations between species and behavioural intentions through warmth. However, the study did not always replicate applicability of the SCM/BIAS map across species for competence, as mediations between competence and post-manipulation passive help, and between competence and passive harm across timepoints, were not significant. The current study has limitations regarding biases in perceptions of animals, even unknown animals, and lack of testing of the full motivated cognition model. Future research should investigate and include implicit bias as a covariate and test the motivated cognition model in full.

Overall, the current study combines with Study 2 to suggest that behavioural and subjective self-relevance mostly may not inform perceptions of and behavioural intentions towards animals. Additionally, whilst there was an effect of behavioural self-relevance on passive harm, this effect was in the opposite direction to predicted. These findings therefore may not support motivated cognition literature, and thus indicate behavioural and subjective self-relevance may not explain why people view pigs negatively (i.e., pet speciesism).

To conclude, Studies 2-3 are the first to causally test the roles of behavioural and subjective self-relevance with dogs and pigs, and uniquely may not support established motivated cognition literature by indicating neither behavioural nor subjective self-relevance cause pet speciesism.

4.7. Overall Discussion

Through four follow-up and pilot studies, it was established that a) the original behavioural and subjective self-relevance manipulations utilised within Study 2 were ineffective at manipulating behavioural and subjective self-relevance, which may explain null findings from Study 2, and b) an alternative ‘imagined restaurant scenario’ was effective at manipulating behavioural and subjective self-relevance. As such, this alternative self-relevance manipulation was implemented within Study 3, to again test if behavioural and subjective self-relevance are causes of pet speciesism. Overall, Study 3 found that behavioural and subjective self-relevance mostly may not inform perceptions of and behavioural intentions towards animals, and thus may not be causes of pet speciesism.

Chapter 5. Pilot Study and Study 4 Exploring Familiarity and Similarity

5.1. Introduction

The current chapter first presents a pilot study (Pilot Study 1b) to develop and pilot familiarity and similarity manipulations, before then implementing these manipulations within Study 4 in this chapter, to test if familiarity and similarity are causes of pet speciesism. These studies are now reported in turn below.

5.2. Pilot Study 1b to Test Familiarity and Similarity Manipulations

5.2.1. Introduction

As Study 1 found correlational relationships between familiarity, similarity, and dogs'/pigs' warmth and/or competence, I aimed to test if these relationships are causal, and therefore if familiarity and similarity can explain pet speciesism. However, before testing for these causal roles, I first needed to develop and pilot familiarity and similarity manipulations which effectively manipulate familiarity and similarity respectively. As such, the current pilot study (Pilot Study 1b) therefore aims to test if familiarity and similarity manipulations developed by the current researcher are effective at manipulating their intended variables. Familiarity is manipulated through either imagined contact with the participant's target animal (familiar condition) or no text (unfamiliar condition), and this manipulation has been informed by imagined contact literature with animals (e.g., Auger & Amiot, 2019b; Cerrato & Forestell, 2022). Similarity is manipulated through fictional newspaper text describing the target animal as either being similar or dissimilar to humans across four traits (behaviour, level of intelligence, sociality, and emotionality), and this manipulation has been informed by previous text manipulations used within anthrozoological literature to elicit similarity (Horne et al., 2021; Leach et al., 2021; Piazza & Loughnan, 2016). As with Studies 2-3, an unknown animal (either tree kangaroo, fossa, or tamandua) is utilised as the target animal, as an adapted version of the novel animal paradigm to assess unmoderated effects of familiarity. To check effectiveness of the familiarity manipulation (manipulation check), the item '*How familiar do you perceive tree kangaroos/fossas/tamanduas to be to you?*' is included to measure familiarity. To check effectiveness of the similarity manipulation (manipulation check), the item '*How similar do you perceive tree kangaroos/fossas/tamanduas to be to you?* is included to measure similarity. Informed by previous imagined contact manipulations with animals (Auger & Amiot, 2019b; Cerrato & Forestell, 2022) and previous text manipulations of similarity for animals (Horne et al., 2021; Leach et al., 2021; Piazza & Loughnan, 2016), I hypothesise that:

H1: Imagined contact with an animal (vs. not) will significantly increase the animal's measured familiarity.

H2: Stated similarity (vs. dissimilarity) of an animal to humans will significantly increase the animal's measured similarity.

Note that this pilot study utilises the same participant sample to also follow-up/pilot text manipulations for behavioural self-relevance, subjective self-relevance, and pet status, but only information relevant to the familiarity and similarity manipulations is reported within the current chapter (see Section 4.2. for pilot study information about the behavioural and subjective self-relevance manipulations [Pilot Study 1a], and Section 7.2. for pilot study information about the pet status manipulation [Pilot Study 1c]).

5.2.2. Methods

5.2.2.1. Participants.

Sixty-eight participants were recruited via social media and Sona as a volunteer sample. Thirteen participants were excluded for providing partial data. As all participants stated they were either a man or woman, no participants had to be excluded to enable gender to be dummy coded for inclusion of gender as a covariate (see Section 5.2.3. for further discussion). Exclusions left a total sample size of 55 participants (81.8% women, 18.2% men; M_{age}=23.38, SD_{age}=5.68, age range: 18-48), which exceeds the recommend 12 participants per condition for pilot studies (Julious, 2005). Participants within each condition are shown in Table 12. Demographics of the sample are reported as follows in percentages, with demographic categories which make up less than 2% of the sample being collapsed into 'other'. For dietary group: 69.1% (meat consumer), 12.7% (reducetarian), 7.3% (vegetarian), and 5.5% each (flexitarian, pescatarian). For nationality: 54.5% (British), 5.5% (Romanian), 3.6% each (German, Indian, Lithuanian, no response, Portuguese, Spanish), and 18.4% other. For ethnicity: 76.1% (White), 12.6% (Asian), 3.6% each (mixed, would rather not say), and 4.1% other. For country of residence ($M_{duration}$=17.91, $SD_{duration}$=10.12, range: 1-48 years): 81.8% (United Kingdom), 3.6% (Germany), and 14.6% other. For religion: 29.1% (atheism), 21.8% (Christianity), 18.2% (agnosticism), 14.5% (would rather not say), 5.5% (no response), 3.6% each (Buddhism, Islam), and 3.7% other.

Table 12.

Participants Within Each Condition for Pilot Study 1b.

Familiarity Condition	Similarity Condition	Number of Participants
Familiar	Similar	13
Familiar	Dissimilar	16
Unfamiliar	Similar	13
Unfamiliar	Dissimilar	13

5.2.2.2. Design.

The current pilot study follows a 2(familiarity: familiar vs. unfamiliar) x 2(similarity: similar vs. dissimilar) between-subjects MANCOVA design, with measured familiarity and similarity as the DVs. Familiarity and similarity were included as DVs to test effectiveness of the manipulations. Gender was included as a covariate (see Section 5.2.3. for further discussion).

5.2.2.3. Materials.

5.2.2.3.1. Familiarity and Similarity Manipulations.

Familiarity was manipulated via an imagined contact scenario developed by the researcher. Specifically, participants were either asked to '*Please now imagine meeting and interacting with a tree kangaroo/fossa/tamandua* [dependent on target animal]' (familiar condition) or alternatively read no text (unfamiliar condition). Similarity was manipulated via the following texts developed by the researcher: '*Tree kangaroos/fossas/tamanduas* [dependent on target animal] *are reportedly similar/dissimilar* [manipulation of similarity condition] *to humans in many areas, including their behaviour, level of intelligence, sociality and emotionality*'. The familiarity and similarity manipulations were combined within this pilot study to assess if familiarity and similarity interact (e.g., from previous literature; Norton et al., 2007), whereby the similar or dissimilar condition was presented first, followed by the imagined contact sentence for the familiarity condition only (participants in the unfamiliar condition saw no additional text).

5.2.2.3.2. Measured Familiarity.

Perceived familiarity was measured via the same single item from Study 1, except '*How familiar do you perceive the following animals to be to you?*' was reworded to '*How familiar do you perceive tree kangaroos/fossas/tamanduas to be to you?*' Additionally, the item was re-scaled from a one to five Likert scale used in Study 1 to a zero to 100 visual analogue scale here to ensure parametric data. A higher score indicates greater perceived familiarity.

5.2.2.3.3. Measured Similarity.

Perceived similarity of the animal to humans was measured using the same single item from Study 1, except *'How similar do you perceive the following animals to be to humans?'* was reworded to '*How similar do you perceive tree kangaroos/fossas/tamanduas* *to be to humans?'*. Like the perceived familiarity manipulation check, this perceived similarity to humans item was re-scaled from a one to five Likert scale used in Study 1 to a zero to 100 visual analogue scale here to ensure parametric data. A higher score indicates greater perceived similarity to humans.

5.2.2.3.4. Attention and Memory Checks.

Attention paid to and memory for the text manipulations was tested through four attention and memory check items developed by the researcher as follows: '*Did the text that you just read ask you to imagine a scenario?*', '*What animal did the text refer to?*', '*Did the text that you just read ask you to imagine contact with a tree kangaroo/fossa/tamandua?*', and '*Did the text that you just read state that tree kangaroos/fossas/tamanduas are similar or dissimilar to humans?*'. These checks aimed to test that participants paid attention to and remembered the texts. Correct answers for each item received a score of one, whilst incorrect answers for each item received a score of zero. All answers were then added together, for a highest possible score of four. Inspection of these checks revealed that the vast majority of the sample (>75%) had perfect scores, indicating sufficient attention and memory for these manipulations.

5.2.2.3.5. Vividness of the Familiarity Manipulation.

Perceived vividness of the imagined familiarity manipulation was measured, as imagined scenarios which are viewed as more vivid have greater impacts on behavioural intentions (Husnu & Crisp, 2010). Vividness was measured through a six-item semantic differential vividness measure from Husnu and Crisp (2010; α=.94), whereby participants answer how much they perceive their imagined scenario as being '*faint vs. vivid*', '*fuzzy vs. clear*', '*dim vs. bright*', '*vague vs. sharp*', '*dull vs. lively*', and '*simple vs. detailed*'. Reliability was adequate for this scale within this study, ω=.89. Therefore, items were summed together to create a total vividness score. Higher scores indicate greater vividness.

No items are reverse-scored. The majority of the sample (>50%) perceived the familiarity manipulation to be vivid.

5.2.2.3.6. Ease of Imaginability of the Familiarity Manipulation.

Perceived ease of imaginability of the imagined familiarity manipulation was measured in order to ensure participants were able to imagine the imagined contact scenario without difficulty. Ease of imaginability was measured through a single item '*How easy or difficult was it for you to imagine the previous scenario in the text you have just read?*' on a -50 (extremely difficult) to 50 (extremely easy) visual analogue scale, informed by previous literature (e.g., Black & Barnes, 2020; Broemer & Diehl, 2004). A higher score indicates greater ease of imaginability. The majority of the sample (>50%) perceived the familiarity manipulation to be easy to imagine.

5.2.2.3.7. Believability of the Similarity Manipulation (Beltramini, 1982; Beltramini & Evans, 1985; Chang, 2011).

Perceived believability of the similarity text manipulation was measured in order to ensure the text was not simply disregarded. Believability was measured through a six-item semantic differential believability measure (Beltramini, 1982; Beltramini & Evans, 1985; α=.94 from Chang, 2011), whereby participants answer how much they perceive the text to be '*unbelievable vs. believable*', '*untrustworthy vs. trustworthy*', '*not credible vs. credible*', '*unreasonable vs. reasonable*', '*not convincing vs. convincing*', and '*biased vs. unbiased*'. Reliability was adequate for this scale within this study, ω=.89. Therefore, items were summed together to create a total believability score. Higher scores indicate greater believability. No items are reverse-scored. The majority of the sample (>50%) perceived the similarity manipulation to be believable.

5.2.2.4. Procedure

Participants were recruited via social media and Sona. The experiment was conducted in September and October 2020 as a voluntary, open survey. After providing informed consent, participants were asked if they recognised tree kangaroos (alongside a photograph of the animal), followed by a fossa and tamandua if participants recognised any previous animal. Animal species names were used throughout the study. The study either proceeded using the unrecognised animal as the target animal, or, if participants recognised all three animals, they were redirected towards the end of the study and did not participate further.

Following initial recognition stage, participants completed the three sections (self-relevance, familiarity/similarity, and pet status) of the pilot study in a randomised order. Here, only the familiarity/similarity section is described (see Section 4.2. for description of the self-relevance section, and Section 7.2. for description of the pet status section). For the familiarity/similarity section, participants were randomly assigned to read one of the four familiarity and similarity text manipulations described in Section 5.2.2.3.1. regarding their target animal. After reading their familiarity/similarity text, participants answered the five attention and memory checks, completed the measures for familiarity and similarity (manipulation checks), and then indicated their perceived vividness and ease of imaginability of the imagined scenario, and perceived believability of the text. Finally, participants provided demographics before being debriefed. One participant reported technical difficulties, but their response was complete and maintained within analyses.

5.2.3. Analyses

A 2(familiarity: familiar vs. unfamiliar) x 2(similarity: similar vs. dissimilar) between-subjects MANCOVA, including gender as a covariate, was conducted on measured familiarity and similarity, to test if the manipulations effectively manipulate familiarity and similarity. As the DVs were conceptually related (i.e., previously found to interact, Norton et al., 2007), and were moderately correlated within the current study, $r > .3$, MANCOVA was deemed appropriate for this analysis.

Gender was again included as a covariate within this MANCOVA. Although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analysis by controlling for and partialling out any relationship between gender and the outcome variables (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and measured familiarity/similarity (the outcome variables) to be statistically controlled for.

Descriptive statistics for *post hoc* pairwise comparisons for significant interaction effects are reported in Tables 13 and 14.

5.2.3.1. Statistical Assumptions to Test H1-H2: Exploring Effects of Familiarity and Similarity Manipulations on Measured Familiarity and Similarity (2x2 MANCOVA).

The DVs failed normality tests in some conditions, *p*s < .05. However, both DVs had acceptable skewness. Measured similarity had non-extreme univariate outliers in two conditions, which did not cause excessive skewness. There were no univariate outliers in measured familiarity. There was one multivariate outlier for two DVs, critical values ≥ 13.82, $p < .001$. Running the MANCOVA including and excluding univariate and multivariate outliers changed one minor multivariate conclusion (Footnote 22). I report the MANCOVA including univariate and multivariate outliers to reflect the unamended dataset.

There was multicollinearity in the unfamiliar condition whereby the animal is described as similar, and in the unfamiliar condition whereby the animal is described as dissimilar, *rs* = .92. However, correlations between the DVs were acceptable (<.9) in the familiar conditions, *r*s ≤ .64, so I maintained both variables separately within a MANCOVA. Linear relationships were present across conditions. Running a follow-up univariate ANCOVA including and excluding univariate outliers did not change univariate conclusions. I report this ANCOVA including outliers to reflect the unamended dataset.

Homogeneity of variances was present for measured familiarity, $p = .1$, but not for measured similarity, $p = .001$. Homogeneity of covariances was not present, $p < .001$.

5.2.3.2. Testing H1-H2: Exploring Effects of Familiarity and Similarity Manipulations on Measured Familiarity and Similarity.

A 2(familiarity: familiar vs. unfamiliar) x 2(similarity: similar vs. dissimilar) between-subjects MANCOVA, including gender as a covariate, was run on measured familiarity and similarity to test **H1-H2.**

5.2.3.2.1. Multivariate Effects of Familiarity and Similarity Manipulations on the Combined DVs.[22]

Not supporting H1: There was no significant main effect of familiarity on the combined DVs, $F(2, 49) = .55$, $p = .58$, $\eta_p^2 = .02$. However, there was a significant main effect of similarity, $F(2, 49) = 8.52$, $p < .001$, $\eta_p^2 = .26$ (large-sized), and a significant interaction between familiarity and similarity, $F(2, 49) = 6$, $p = .01$, $\eta_p^2 = .2$ (large-sized), on the combined DVs. I followed up these significant multivariate effects with univariate ANCOVAs on the DVs separately.

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[22] When excluding univariate and multivariate outliers, the interaction between familiarity and similarity on the combined DVs becomes non-significant, $F(2, 37) = 2.9$, $p = .07$, $\eta_p^2 = .14$.

5.2.3.2.2. H1: Univariate Effects of Familiarity and Similarity Manipulations on Measured Familiarity.

There was a significant interaction between familiarity and similarity on measured familiarity, $F(1, 50) = 4.42, p = .04, \eta_p^2 = .08$ (medium-sized). *Post hoc* pairwise comparisons revealed that, when the animal was described as being similar to humans only, the animal was deemed more familiar in the familiar condition than in the unfamiliar condition, $p = .046$. No such effect was present when the animal was described as being dissimilar to humans, $p = .39$. Additionally, in the familiar condition only, the animal was deemed more familiar when the animal was described as being similar to humans compared to when the animal was described as being dissimilar to humans, $p = .002$. No such effect was present in the unfamiliar condition, $p = .78$.

Table 13.
Descriptive Statistics for Interaction Effect of Familiarity and Similarity Manipulations on Measured Familiarity.

Condition	Familiar Mean	Familiar *SE*	Unfamiliar Mean	Unfamiliar *SE*
Similar	42.95	6.39	24.36	6.43
Dissimilar	14.21	5.85	21.82	6.43

There was also a significant main effect of similarity on measured familiarity, $F(1, 50) = 6.3, p = .02, \eta_p^2 = .11$ (medium-to-large-sized). However, this main effect is qualified by the above two-way interaction and is therefore not expanded upon further here.

5.2.3.2.3. H2: Univariate Effects of Familiarity and Similarity Manipulations on Measured Similarity.

Supporting H2: There was a significant main effect of similarity on measured similarity, $F(1, 50) = 16.4, p < .001, \eta_p^2 = .25$ (large-sized), whereby animals were deemed more similar when described as similar ($M = 40.33, SE = 4.53$) as opposed to described as dissimilar ($M = 15.03, SE = 4.3$). However, this main effect is qualified by a significant interaction between familiarity and similarity on measured similarity, $F(1, 50) = 11.54$, $p = .001$, $\eta_p^2 = .19$ (large-sized). *Post hoc* pairwise comparisons revealed that, when the animal was described as being similar to humans only, the animal was deemed more similar in the familiar condition than in the unfamiliar condition, $p = .003$. No such effect was present when the animal was described as being dissimilar to humans, $p = .11$. Additionally, in the familiar condition only, the animal was deemed more similar when the animal was described as being similar to humans compared to when the animal was described as being dissimilar to humans, $p < .001$. No such effect was present in the unfamiliar condition, $p = .65$.

Table 14.
Descriptive Statistics for Interaction Effect of Familiarity and Similarity Manipulations on Measured Similarity.

Condition	Familiar Mean	Familiar *SE*	Unfamiliar Mean	Unfamiliar *SE*
Similar	54.37	6.4	26.3	6.45
Dissimilar	7.84	5.86	22.22	6.45

5.2.4. Discussion and Conclusion

As expected, the similar condition led to greater perceived similarity than the dissimilar condition, thereby supporting **H2,** and in line with previous literature utilising text manipulations for similarity (e.g., Horne et al., 2021; Leach et al., 2021; Piazza & Loughnan, 2016). Therefore, the current study demonstrates that the similarity manipulation developed by the researcher is effective at manipulating similarity. However, effects of this manipulation on measured similarity may vary depending on *familiarity,* indicating that similarity and familiarity must be separated within experimental manipulations to avoid interaction effects.

Furthermore, the familiarity manipulation was not found to be effective within the current pilot study, which does not support **H1** or previous imagined contact literature (Auger & Amiot, 2019b; Cerrato & Forestell, 2022). However, again, the familiarity and similarity manipulations did interact on measured familiarity, thus further emphasising the importance of separating similarity and familiarity within manipulations.

Informed by these findings, the similarity and familiarity manipulations are separated and utilised within Study 4 to test causal effects of familiarity and similarity on pet speciesism. As the similarity manipulation was found to be effective in manipulating similarity here, this manipulation is mostly unchanged within Study 4. However, the manipulation has been slightly amended to attempt to enhance effectiveness of the manipulation. Specifically, legitimacy of the texts and appeal to authority are emphasised (Walton, 2010) by including the phrases '*imagine reading the following text in the newspaper*' and '*according to animal behaviour experts*' at the beginning of the text within Study 4. As the familiarity manipulation was found to be ineffective in manipulating familiarity here, the manipulation has been amended for Study 4 in an attempt to make this manipulation effective. Firstly, participants elaborated on the imagined contact by writing a passage of text describing the imagined scenario for one minute, providing as much detail as possible. This descriptive task was included to enhance vividness and realism of the imagined scenario ('elaboration'; Husnu & Crisp, 2010). A similar elaboration task has been utilised before for imagined contact with animals (Auger & Amiot, 2019b). Secondly, the unfamiliar condition was amended from a control condition with no imagined scenario to an imagined scenario interacting with a football, to ensure comparison of like-for-like imagined scenarios (i.e., both scenarios require active involvement and occur outdoors).

5.3. Study 4: Causal Exploration of Familiarity and Similarity

5.3.1. Introduction and Extension from Study 1

Study 1 found that familiarity was significantly positively linked only to dogs' warmth and only pigs' competence. The differential relationships between familiarity and warmth vs. competence depending on species only partially align with previous research, which would instead suggest positive relationships between familiarity and all perceptions of animals (Morris et al., 2012; Possidónio et al., 2019). Specifically, people have typically been found to prefer animals with which they are more familiar (e.g., through imagined contact; Auger & Amiot, 2019b), whereby research on familiarity with human outgroups indicates positive effects of familiarity through intergroup contact operate through reducing negative affect (e.g., intergroup anxiety; Pettigrew & Tropp, 2008), and increasing positive affect (Tausch & Hewstone, 2010), towards the outgroup. Therefore, imagined intergroup contact with an animal would be theorised to enhance positive affect, and reduce negative affect, towards the animal, thus improving the animal's perceived warmth and competence, and behavioural intentions towards the animal. Study 1 findings, whereby greater familiarity was associated only with dogs' greater warmth and pigs' greater competence, therefore indicate greater complexity when applying familiarity to the SCM, whereby the relationship between familiarity and warmth/competence perceptions of an animal may be moderated by the species of the animal.

The current study therefore extends previous literature and further investigates Study 1 findings by testing *causal* effects of familiarity on SCM variables (warmth/competence), whereby familiarity is manipulated through an imagined contact manipulation either with the participant's target animal (familiar condition) or an unrelated object (football; unfamiliar condition). This familiarity manipulation was piloted in Pilot Study 1b (Section 5.2.), and has been adapted slightly within the current study by changing the unfamiliar condition from no text within the pilot study to an alternative imagined scenario with a football in the current study. Additionally, to enhance vividness of the imagined contact, participants are now asked within the current study to write about this imagined scenario for one minute. As with Studies 2-3, an unknown animal (either tree kangaroo, fossa, or tamandua) is utilised as the target animal, as an adapted version of the novel animal paradigm to assess unmoderated effects of familiarity. Warmth and competence are again measured within the current study using the SCM subscales from Sevillano and Fiske (2016b). In line with the equivocal Study 1 findings discussed above, I predict that:

H1: Familiar (vs. unfamiliar) animals will be deemed significantly warmer (**a**) and/or more competent (**b**).

Unlike familiarity, Study 1 found that similarity was significantly positively associated with warmth *and* competence of dogs and pigs. These positive relationships between similarity and perceptions of animals align fully with previous literature (Leach et al., 2021), whereby people prefer and/or view more favourably animals which are described as or deemed more similar to humans (Batt, 2009; Kozachenko & Piazza, 2021; Leach et al., 2021; Possidónio et al., 2019). This favourable effect of similarity is theorised to arise from similarity enabling 'humanisation' of the similar animal, by encouraging inclusion of the animal within our moral circle, and thereby enhancing moral concern for the animal (Bastian et al., 2012): As such, previously found positive effects of similarity may extend to the SCM, whereby an animals' greater perceived similarity to humans would theoretically cause the animal's greater perceived warmth and competence. The current study therefore extends previous literature and Study 1 findings by testing *causal* effects of similarity on SCM variables (warmth/competence), whereby similarity is manipulated within the current study through fictional newspaper text describing the target animal as either being similar or dissimilar to humans across four traits (behaviour, level of intelligence, sociality and emotionality), piloted in Pilot Study 1b (Section 5.2.). Again, an unknown animal (either tree kangaroo, fossa, or tamandua) is utilised as the target animal, as an adapted version of the novel animal paradigm to assess unmoderated effects of similarity. Informed by above discussed previous literature and Study 1 findings, it is hypothesised that:

H2: Purportedly similar (vs. dissimilar) animals will be deemed significantly warmer (**a**) and more competent (**b**).

Additionally, like Studies 2-3, the current study extends possible causal effects of familiarity and similarity from warmth and competence to include behavioural intentions (active help, active harm, passive help, passive harm), in line with the BIAS map, whereby behavioural intentions are again measured within the current study using the BIAS map subscales from Sevillano and Fiske (2016b). Specifically, the BIAS map states that warmth should inform greater active help and less active harm, whilst competence should inform greater passive help and less passive harm (Cuddy et al., 2007). Thus, per the BIAS map, relationships between familiarity and similarity and warmth and/or competence from Study 1 should extend to behavioural intentions within this study. Therefore, I predict that differences in warmth/competence perceptions of the target animal arising from familiarity and similarity will extend to behavioural intentions, such that:

H3: If familiar (vs. unfamiliar) animals are deemed significantly warmer (i.e., **H1a** is evidenced), familiar (vs. unfamiliar) animals will be subject to significantly less active harm (**a**) and more active help (**b**). If familiar (vs. unfamiliar) animals are deemed significantly more competent (i.e., **H1b** is evidenced), familiar (vs. unfamiliar) animals will be subject to significantly less passive harm (**c**) and more passive help (**d**).

H4: If purportedly similar (vs. dissimilar) animals are deemed significantly warmer (i.e., **H2a** is evidenced), purportedly similar (vs. dissimilar) animals will be subject to significantly less active harm (**a**) and more active help (**b**). If purportedly similar (vs. dissimilar) animals are deemed significantly more competent (i.e., **H2b** is evidenced), purportedly similar (vs. dissimilar) animals will be subject to significantly less passive harm (**c**) and more passive help (**d**).

Inclusion of measurements for behavioural intentions within this study also again enables applicability of the BIAS map to animals to be tested (Sevillano & Fiske, 2016b, 2019). That is, it can be tested directly if any effects of familiarity and similarity on active and passive behavioural intentions are mediated through warmth and competence respectively, in line with both general SCM and BIAS map literature (Cuddy et al., 2007) and SCM/BIAS map literature applied to animals specifically (Sevillano & Fiske, 2016b, 2019). As such, I hypothesise that:

H5: Post-manipulation warmth will significantly mediate relationships between familiarity and active harm, and familiarity and active help. That is, familiar (vs. unfamiliar) animals will be deemed significantly warmer post-manipulation, which will in turn significantly decrease post-manipulation active harm (**a**) and increase post-manipulation active help (**b**).

H6: Post-manipulation warmth will significantly mediate relationships between similarity and active harm, and similarity and active help. That is, animals portrayed as similar (vs. dissimilar) will be deemed significantly warmer post-manipulation, which will in turn significantly decrease post-manipulation active harm (**a**) and increase post-manipulation active help (**b**).

H7: Post-manipulation competence will significantly mediate relationships between familiarity and passive harm, and familiarity and passive help. That is, familiar (vs. unfamiliar) animals will be deemed significantly more competent post-manipulation, which will in turn significantly decrease post-manipulation passive harm (**a**) and increase post-manipulation passive help (**b**).

H8: Post-manipulation competence will significantly mediate relationships between similarity and passive harm, and similarity and passive help. That is, animals portrayed as similar (vs. dissimilar) will be deemed significantly more competent post-manipulation, which will in turn significantly decrease post-manipulation passive harm (**a**) and increase post-manipulation passive help (**b**).

5.3.2. Methods

5.3.2.1. Participants.

Three-hundred-and-forty-six participants were recruited via volunteer sampling. Qualtrics quota sampling was implemented to ensure approximately 50% men and 50% women, alongside representative numbers of people of different dietary identities in the sample in proportion to the population: approximately 86% meat consumers, 6% vegetarians, 5% pescatarians, and 3% vegans per the United Kingdom population (Johnson, 2022). People with a flexitarian diet did not have a specific quota, as numbers of flexitarians in the population have not been systematically measured.

One-hundred-and-forty-seven participants were excluded for: exceeding demographic quotas (n=99), partial data (n=37), or participant withdrawal (n=9). As all analyses included gender as a covariate (see Section 5.3.3. for further discussion), two non-binary participants were excluded to enable gender to be dummy coded into men (coded as zero; n=98) and women (coded as one; n=101). Exclusions left a sample of 199 participants (50.8% women, 49.2% men; M_{age}=25.36, SD_{age}=8.43, age range=18-69), which exceeded the minimum required sample size of 179 per a G*Power *a priori* power analysis for a MANOVA analysis (‘repeated measures, within-between interaction’, medium effect size f=.25, four groups, two measurements, α=.05, power = .8).

One-hundred-and-ninety participants completed the study about tree kangaroos, whilst nine participants recognised the tree kangaroo and completed the study about fossas (*n*=8) or tamanduas (if they recognised the fossa; *n*=1). Participants within each condition are shown in Table 15. Demographics of the sample are reported as follows in percentages, with demographic categories which make up less than 2% of the sample being collapsed into ‘other’. The percentage of participants for each diet approximately matches sizes within the general population. For dietary group: 84.4% (meat consumer), 5.5% (vegetarian), 5% (pescatarian), 2.5% (vegan), and 2.6% other. For nationality: 51.3% (United Kingdom/British), 12.6% (United States), 7% (Indian), 2% (Romanian), and 27.1% other. For ethnicity: 73.2% (White), 14.5% (Asian), 6.5% (mixed), 2.5% (Black), and 3.3% other. For country of residence (M_{duration}=20.53, SD_{duration}=10.8, range: six months to 68 years): 62.3% (United Kingdom), 12.6% (United States), 6% (India), and 19.1% other. For religion: 29.1% (Christianity), 24.1% (atheism), 14.6% (agnosticism), 12.6% (would rather not say), 6.5% (Hinduism), 4.1% each (Islam, no religion), 2.5% (Buddhism), and 2.4% other.

Table 15.
Participants Within Each Condition for Study 4.

Condition	Number of Participants
Similar	48
Dissimilar	52
Familiar	50
Unfamiliar	49

5.3.2.2. Design.

This experiment follows a 4(condition: familiar vs. unfamiliar vs. similar vs. dissimilar; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed MANCOVA design, with warmth, competence, active help, passive help, active harm, and passive harm as the DVs. Additionally, to test effectiveness of the texts in manipulating measured familiarity or measured similarity (manipulation checks), a one-way (condition: familiar vs. unfamiliar) ANCOVA on measured familiarity, and a one-way (condition: similar vs. dissimilar) ANCOVA on three measurements of similarity, were also conducted. Gender and neutrality were included as covariates (see Section 5.3.3. for further discussion).

5.3.2.3. Materials.

5.3.2.3.1. Target Animals and Animal Photographs.

The current study again employed the novel animal paradigm by implementing the same photographs of the animals (tree kangaroo, fossa, tamandua) as Study 2, to enable easier visualisation of the imagined scenario, and avoid biased perceptions of the animal due to species name. The tree kangaroo photograph was sourced from https://www.shutterstock.com/image-photo/close-shot-cute-tree-kangaroo-168261035, the fossa photograph sourced from https://www.flickr.com/photos/mathiasappel/19504925051, and the tamandua photograph sourced from https://tinyurl.com/2jazjz3s.

5.3.2.3.2. Familiarity Text Manipulations.

As imagined contact with animals has previously been utilised to inform perceptions of animals (Auger & Amiot, 2019b), familiarity was manipulated via an imagined contact scenario developed by the researcher (piloted in Pilot Study 1b). Specifically, participants were asked to either '*Please now imagine meeting and interacting with the animal in the photograph*', whereby the 'animal in the photograph' refers to the participant's unknown target animal (tree kangaroo, fossa, tamandua; familiar condition), or asked to '*Please now imagine interacting with a football*', whereby the football constitutes an unrelated object (unfamiliar condition). All participants were then asked to do the following description task: '*In the textbox below, describe this imagined scenario. Provide as much detail as possible and keep writing until at least 1 minute has passed.*' Nearly all participants (94% in familiar condition; 97.96% in unfamiliar condition) engaged with this description task within this study. Participants were not excluded for not engaging with this task, as the task was intended as an additional visualisation aid for elaboration purposes only. Overall, this familiarity text manipulation was informed by previous imagined contact manipulations with animals (Auger & Amiot, 2019b).

5.3.2.3.3. Similarity Text Manipulations.

Similarity was manipulated via texts developed and successfully piloted by the researcher (piloted in Pilot Study 1b). Specifically, participants were asked to '*Imagine reading the following text in the newspaper*', with the following text stating that '*According to animal behaviour experts, the species in the photograph is reportedly similar [similar condition] / dissimilar [dissimilar condition] to humans in many ways, including in terms of behaviour, level of intelligence, sociality and emotionality.*' Text manipulations have been used previously within anthrozoological literature to manipulate similarity (Horne et al., 2021; Leach et al., 2021; Piazza & Loughnan, 2016). Participants read the text for at least one minute to ensure sufficient attention.

5.3.2.3.4. Warmth and Competence (Sevillano & Fiske, 2016b).

Warmth and competence were measured with the same items from Studies 1-3: '*warm*', '*well-intentioned*', '*friendly*' (warmth), and '*competent*', '*skillful*', '*intelligent*' (competence; Sevillano & Fiske, 2016b). The current study utilised the same semantic differential scaling from -3 to 3 as Study 3 and referred to '*the species within the previous photograph*'. Items within each subscale were summed to provide warmth and competence scores. Reliability was adequate within this study for warmth (pre-manipulation ω=.73; 95% BCa CI [.63, .8]; post-manipulation ω=.84; 95% BCa CI [.77, .88]) and competence (pre-manipulation ω=.79; 95% BCa CI [.72, .84]; post-manipulation ω=.91; 95% BCa CI [.88, .94]).

5.3.2.3.5. Behavioural Intentions Towards the Animal (Sevillano & Fiske, 2016b).

Behavioural intentions were measured with the same items from Studies 2-3: '*support*', '*help*', '*behave friendly towards*', '*interact with*' the animal (active help), '*sustain*', '*conserve*' the animal (passive help), '*kill*', '*injure*', '*exterminate*', '*trap*', '*reject*' the animal (active harm), and '*let the species die off*', '*ignore*' the animal (passive harm; Sevillano & Fiske, 2016b). The current study utilised the same semantic differential scaling from -3 to 3 as Study 3 and referred to '*the species within the previous photograph*'. Items within each subscale were summed to provide active help, passive help, active harm, and passive harm scores. Reliability was adequate within this study for active harm (pre-manipulation ω=.8; 95% BCa CI [.69, .88]; post-manipulation ω=.9; 95% BCa CI [.81, .94]), and active help (pre-manipulation ω=.71; 95% BCa CI [.62, .79]; post-manipulation ω=.77; 95% BCa CI [.68, .84]. Reliability was inadequate within this study across timepoints for passive help (pre-manipulation r_{sb}=.66; post-manipulation r_{sb}=.69), and passive harm (pre-manipulation r_{sb}=.57; post-manipulation r_{sb}=.46). As the passive help and passive harm subscales only contain two items, I did not run PAFAs for these subscales. Due to the inadequate reliability of these subscales, findings from theses subscales should be interpreted with caution.

5.3.2.3.6. Perceived Neutrality Towards the Animal.

Neutrality was measured via the same single item from Study 3, with a higher score indicating higher neutrality and less bias: '*How neutral do you perceive the species in the previous photograph to be?*' from zero to 100.

5.3.2.3.7. Perceived Familiarity (Manipulation Check).

Perceived familiarity was measured via the same single item from Study 1, except '*How familiar do you perceive the following animals to be to you?*' was reworded to '*How familiar do you perceive the species in the photograph to be to you?*' to avoid participant bias from hearing the species name. Additionally, the item was re-scaled from a one to five Likert scale used in Study 1 to a zero to 100 visual analogue scale here to ensure parametric data. A higher score indicates greater perceived familiarity.

5.3.2.3.8. Perceived Similarity to Humans (Manipulation Check).

Perceived similarity of the animal to humans was measured with the same single item from Study 1, except *'How similar do you perceive the following animals to be to humans?'* was reworded to '*How similar do you perceive the species in the photograph to be to humans?'* to avoid participant bias from hearing the species name. This single item was utilised as one of the manipulation checks for the similarity manipulation. Like the perceived familiarity manipulation check, this perceived similarity to humans item was re-scaled from a one to five Likert scale used in Study 1 to a zero to 100 visual analogue scale here to ensure parametric data. A higher score indicates greater perceived similarity to humans.

5.3.2.3.9. Perceived Shared Traits with Humans (Manipulation Check; Bastian et al., 2012a, Bilewicz et al., 2011, Rothgerber, 2014).

To validate the perceived similarity to humans manipulation check, I also utilised a scale which explicitly measures perceived shared traits of the target animal with humans (Rothgerber, 2014, derived from Bastian et al., 2012a, Bilewicz et al., 2011). The scale splits into two subscales (emotional and cognitive capacities) and asks participants to rate how much they view an animal as sharing the following capacities with humans: '*nostalgia'*, '*happiness'*, '*melancholy'*, '*excitement'*, '*guilt', 'panic'* (emotional capacities), and '*self-control*', '*morality*', '*memory*', '*planning*' (cognitive capacities). Wording was adapted within this study to refer to '*the species in the photograph*' throughout. Participants answered on a Likert scale from one '*only humans have this capacity*' to seven '*the species in the photograph and humans have this capacity to the same degree*', with the midpoint at four '*the species in the photograph has this capacity to some degree*'. No items were reverse-scored. Items within each subscale were summed to provide emotional and cognitive capacity scores, with higher scores on each subscale indicating higher levels of that variable. Reliability was adequate within this study for emotional capacities (ω=.73; 95% BCa CI [.5, .81]), but reliability was inadequate for cognitive capacities (ω=.63; 95% BCa CI [.47, .73]). I therefore ran a PAFA (Appendix 2g) with direct oblimin rotation to assess factorial validity of the cognitive capacities subscale, alongside assessing inter-item correlations to further test reliability, and communality values to test common variance. All four items adequately loaded onto one factor (≥ .47), indicating acceptable factorial validity, whilst the first item had adequate communality (.57), and the other three items had adequate (though not ideal) communality (≥.22; Child, 2006). Additionally, whilst item three correlated inadequately with item two, *r*=.14, and item four, *r*=.25, item three correlated adequately with item one, *r*=.41. I therefore retained item three. All other items correlated adequately with each other, *r*s ≥ .31, and were therefore also retained. However, findings with this scale should be interpreted with caution due to inadequate reliability.

5.3.2.4. Procedure.

Participants were recruited via avenues like social media and Sona (Appendix 8). All participants were required to not have taken part in previous studies within this thesis. The experiment was conducted in January and February 2021 as a voluntary, open survey. After providing informed consent, participants gave demographic information, with participants exceeding diet and/or gender quotas being automatically excluded from participating further by Qualtrics. Remaining eligible participants were presented with a photograph of a tree kangaroo and asked if they recognised the animal, followed by a fossa and then tamandua if participants recognised any previous animal. Animal species names were not used during the study. The experiment either proceeded using the unrecognised animal as the target animal, or, if participants recognised all three animals, they were redirected to the end of the experiment. After initial recognition, participants indicated their perceived neutrality towards their target animal, the animal's warmth and competence, and behavioural intentions towards the animal (all scales and items within scales presented in randomised order).

Participants were subsequently randomly assigned into one of four conditions (familiar vs. unfamiliar vs. similar vs. dissimilar) and read the text within their condition as described in Sections 5.3.2.3.2. and 5.3.2.3.3. After reading their assigned text, participants rated the animal's perceived familiarity, perceived similarity to humans, and perceived shared emotional and cognitive traits with humans, and again rated the animal's warmth and competence and behavioural intentions towards the animal (all scales and items within scales presented in randomised order). Finally, participants were debriefed. Twenty-one participants reported technical difficulties, but responses were complete and maintained within analyses. ARU undergraduate psychology students (*n*=33) received 0.25 Sona credits as reimbursement. All other participants could enter a prize draw to win of two £50 Amazon gift vouchers if they wished.

5.3.3. Analyses

A 4(condition: familiar vs. unfamiliar vs. similar vs. dissimilar; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed MANCOVA was conducted on warmth, competence, active help, passive help, active harm, and passive harm. As all of the DVs were conceptually related (from the SCM/BIAS map and subscales of the same overall scales), alongside many DVs being statistically related through moderate correlations, $rs \geq .3$, MANCOVA was deemed appropriate for this analysis. Additionally, a one-way (familiarity: familiar vs. unfamiliar) between-subjects ANCOVA was run on measured familiarity, whilst a one-way (similarity: similar vs. dissimilar) between-subjects MANCOVA was conducted on perceived similarity to humans, perceived shared emotional traits with humans, and perceived shared cognitive traits with humans. For this MANCOVA, all of the DVs were conceptually related (i.e., all measuring similarity to humans in different ways), alongside perceived shared emotional traits with humans and perceived shared cognitive traits with humans constituting subscales on the same overall scale. Although the DVs were not moderately statistically related in the similar condition, *r*s ≤ .23, there were moderate statistical relationships in the dissimilar condition between perceived similarity to humans and perceived shared emotional traits with humans, *r* = .36, and between perceived shared emotional traits with humans and perceived shared cognitive traits with humans, *r* = .63. Therefore, MANCOVA was deemed appropriate for this analysis to account for these underlying relationships. Finally, like Study 3, one-tailed one-sample t-tests were conducted on warmth, competence, and behavioural intentions.

Gender was again included as a covariate within the analyses. Again, although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analyses by controlling for and partialling out any relationship between gender and the outcome variables (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and warmth/competence perceptions of animals and behavioural intentions towards them (the outcome variables) to be statistically controlled for. Neutrality was also included within analyses as a covariate to account for bias in perceptions of animals. That is, by including neutrality as a covariate, the statistical model is then adjusted to account for this variable, thereby reducing variability and bias in the findings (Keen & Tiemeier, 2022), and increasing power of the analyses by statistically controlling for any possible relationship between neutrality and perceptions of/behavioural intentions towards animals (Tabachnick & Fidell, 2014).

Descriptive statistics for significant discussed main effects or for *post hoc* pairwise comparisons for significant interaction effects are reported in Tables 16-20.

5.3.3.1. Statistical Assumptions to Test H1-H4: Exploring Effects of Familiarity/Similarity Condition on SCM/BIAS Map Variables (4x2 MANCOVA)

DVs frequently failed normality tests, *p*s < .05, but all DVs had acceptable skewness, except for active harm across conditions. Due to excessive skewness, multiple extreme univariate outliers, and floor effects in active harm, I also ran a MANCOVA excluding active harm as a DV, which did not change multivariate conclusions compared to when this variable was included as a DV. I therefore report the MANCOVA including active harm as a DV.

All DVs except active harm had univariate outliers which did not cause excessive skewness. There were multivariate outliers for six DVs, critical values ≥ 22.46, *p* < .001. Running the MANCOVA including and excluding univariate and multivariate outliers was not possible due to floor effects in active harm. Running the MANCOVA including and excluding univariate and multivariate outliers without active harm as a DV indicated multivariate conclusions do not change. I therefore report the MANCOVA including univariate and multivariate outliers.

There was no multicollinearity, *r*s ≤ .83. Linear relationships between the DVs across conditions were mostly present. Running follow-up univariate ANCOVAs including and excluding univariate outliers for warmth, competence, and passive help did not change conclusions. Excluding outliers changed one main conclusion for active help (Footnote 23), and one minor finding for passive harm (Footnote 24). I report all analyses including outliers to reflect the unaltered dataset. Excessive skewness, multiple univariate outliers, and floor effects in active harm meant assumptions for the ANCOVA on this DV were violated.

However, I proceeded with this ANCOVA due to robustness of ANCOVA to non-normality, and lack of non-parametric alternatives. Results from this ANCOVA should be interpreted with caution.

Homogeneity of variances was present for warmth, pre-manipulation competence, pre-manipulation active help, passive help, passive harm, and pre-manipulation active harm, *p*s > .05. Homogeneity of variances was absent for post-manipulation competence, post-manipulation active help, and post-manipulation active harm, *p*s < .05. Homogeneity of covariances was not present, $p < .001$.

5.3.3.2. Statistical Assumptions for Familiarity Manipulation Check: Exploring Effect of Familiarity Manipulation on Measured Familiarity (One-Way ANCOVA)

Measured familiarity failed normality tests across conditions, *p*s < .05, but skewness was acceptable. There were no outliers in measured familiarity. Homogeneity of variances was present, $p > .05$.

5.3.3.3. Statistical Assumptions for Similarity Manipulation Checks: Exploring Effects of Similarity Manipulation on Measured Similarity (One-Way MANCOVA)

DVs sometimes failed normality tests, *p*s < .05, but all DVs had acceptable skewness. Perceived shared emotional and cognitive traits had no univariate outliers, whilst perceived similarity had one univariate outlier in the dissimilar condition only. There were no multivariate outliers for three DVs, critical values < 16.27, $p < .001$. Running the MANCOVA including and excluding univariate outliers did not change multivariate conclusions. I therefore report the MANCOVA including univariate outliers.

There was no multicollinearity, $r\text{s} \leq .63$. Whilst some linear relationships were present between some DVs in the dissimilar condition, not all DVs had linear relationships, especially in the similar condition. Running a follow-up univariate ANCOVA including and excluding the univariate outlier for perceived similarity to humans did not change conclusions. Homogeneity of variances was present for all DVs, $p\text{s} > .05$. Homogeneity of covariances was present, $p > .001$.

5.3.3.4. Familiarity Manipulation Check: Exploring Effect of Familiarity Manipulation on Measured Familiarity

A one-way(condition: familiar vs. unfamiliar) between-subjects ANCOVA, including gender and neutrality as covariates, was conducted on familiarity to test effectiveness of the familiarity text in manipulating measured familiarity. An ANCOVA was conducted for the familiarity manipulation check instead of an independent-samples *t*-test to enable inclusion of gender and neutrality as covariates. To be deemed effective, the familiarity manipulation would be expected to increase measured familiarity when asked to imagine interacting with the target animal (familiar condition), instead of interacting with a football (unfamiliar condition; see Table A6 in Appendix 4 for full inferential statistics). The ANCOVA did not find a significant effect of the familiarity manipulation on measured familiarity, $F(1, 93) = 1.14$, $p = .29$, $\eta_p^2 = .01$. Thus, the familiarity manipulation was not effective at manipulating its intended variable of measured familiarity. Beyond the manipulation check, there was also a significant main effect of neutrality on measured familiarity, $F(1, 93) = 6.63$, $p = .01$, $\eta_p^2 = .07$ (medium-sized), whereby greater neutrality was linked to significantly greater familiarity, $B = .36$, $SE = .14$.

5.3.3.5. Similarity Manipulation Checks: Exploring Effects of Similarity Manipulation on Measured Similarity

A one-way(condition: similar vs. dissimilar) between-subjects MANCOVA, including gender and neutrality as covariates, was conducted on three similarity measures (perceived similarity to humans, perceived shared emotional capacities with humans, and perceived shared cognitive capacities with humans), to test effectiveness of the similarity text in manipulating measured similarity. To be deemed effective, the similarity manipulation would be expected to increase all three measures of similarity when the target animal is described as similar to humans (similar condition), instead of dissimilar (dissimilar condition; see Table A7 in Appendix 4 for full inferential statistics).

5.3.3.5.1. Multivariate Effects of Similarity Manipulation on the Combined DVs.

The similarity manipulation had a significant effect on the combined DVs, $F(3, 93) = 9.17, p < .001, \eta_p^2 = .23$ (large-sized). In addition, neutrality had a significant effect on the combined DVs, $F(3, 93) = 3.45, p = .02, \eta_p^2 = .1$ (medium-sized). There was no significant effect of gender on the combined DVs, $F(3, 93) = 1.18, p = .32, \eta_p^2 = .04$. I followed up significant multivariate effects with univariate ANCOVAs on the DVs below.

5.3.3.5.2. Univariate Effects of Similarity Manipulation on Perceived Similarity to Humans.

There was a significant effect of the similarity manipulation on perceived similarity to humans, $F(1, 95) = 19.46, p < .001, \eta_p^2 = .17$ (large-sized), in the expected direction. That is, participants in the similar condition perceived the animal to be more similar to humans than participants in the dissimilar condition. Thus, the similarity text was effective at manipulating similarity when measured through perceived similarity to humans. Beyond the manipulation check, there was also a significant main effect of neutrality on perceived similarity to humans, $F(1, 95) = 7.95$, $p = .01$, $\eta_p^2 = .08$ (medium-sized), whereby greater neutrality was linked to significantly greater perceived similarity to humans, $B = .36$, $SE = .13$.

5.3.3.5.3. Univariate Effects of Similarity Manipulation on Perceived Shared Emotional Traits with Humans.

There was a significant effect of the similarity manipulation on perceived shared emotional traits, $F(1, 95) = 11.2$, $p = .001$, $\eta_p^2 = .11$ (medium-sized), in the expected direction. Specifically, participants in the similar condition perceived the animals to share more emotional traits with humans than participants in the dissimilar condition. Thus, the similarity text was effective at manipulating similarity when measured through perceived shared emotional traits.

5.3.3.5.4. Univariate Effects of Similarity Manipulation on Perceived Shared Cognitive Traits with Humans.

There was a significant effect of the similarity manipulation on perceived shared cognitive traits, $F(1, 95) = 13.66$, $p < .001$, $\eta_p^2 = .13$ (medium-to-large-sized), in the expected direction. Specifically, participants in the similar condition perceived the animals to share more cognitive traits with humans than participants in the dissimilar condition. Thus, the similarity text was effective at manipulating similarity when measured through perceived shared cognitive traits. However, this finding should be interpreted with caution due to inadequate scale reliability.

Table 16.
Descriptive Statistics for Effect of Similarity Manipulation on Measured Similarity Variables.

Manipulated Similarity Condition	Similarity to Humans Mean	Similarity to Humans *SD*	Emotional Traits Mean	Emotional Traits *SD*	Cognitive Traits Mean	Cognitive Traits *SD*
Similar	51.53	26.37	26.51	5.67	16.96	4.64
Dissimilar	30.35	25.44	22.04	7.1	13.56	4.7

5.3.3.6. Testing H1-H4: Exploring Effects of Familiarity/Similarity Condition on SCM/BIAS Map Variables.

A 4(condition: familiar vs. unfamiliar vs. similar vs. dissimilar) x 2(time: pre- vs. post-manipulation) mixed MANCOVA, including gender and neutrality as covariates, was run on warmth, competence, active harm, active help, passive harm, and passive help to test **H1-H4** (see Table A8 in Appendix 4 for full inferential statistics).

5.3.3.6.1. Multivariate Effects of Familiarity/Similarity Condition on the Combined DVs.

There was a significant interaction effect between time and condition on the combined DVs, $F(18, 570) = 3.16, p < .001, \eta_p^2 = .09$ (medium-sized). There was also a significant main effect of condition on the combined DVs, $F(18, 570) = 1.71, p = .03, \eta_p^2 = .05$ (small-to-medium-sized). All other multivariate interactions and main effects were non-significant, *p*s > .05. I followed up significant multivariate effects with univariate ANCOVAs on the DVs below.

5.3.3.6.2. Univariate Effects of Familiarity/Similarity Condition on Warmth.

There was a significant interaction between condition and time on warmth, $F(3, 193) = 4.04, p = .01, \eta_p^2 = .06$ (medium-sized). **Agreeing with H2a**: *Post hoc* pairwise comparisons revealed the similar condition significantly increased warmth from pre-manipulation to post-manipulation, $p = .01$, $d = .3$ (small-sized). Additionally, the dissimilar condition significantly decreased warmth from pre-manipulation to post-manipulation, $p = .03$, $d = .31$ (small-sized). Post-manipulation only, the similar condition caused more warmth than the dissimilar condition, $p = .002$, $d = .73$ (medium-sized), an effect not present pre-manipulation, $p = 1$. **Not supporting H1a:** *Post hoc* pairwise comparisons revealed no significant post-manipulation difference in warmth between the familiar and unfamiliar conditions, $p = 1$, nor any significant differences from pre- to post-manipulation after exposure to the familiar, $p = .65$, or unfamiliar, $p = .22$, conditions.

Table 17.
Descriptive Statistics for Interaction Effect of Familiarity/Similarity Condition and Time on Warmth.

Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Similar	3.36	.5	4.37	.51
Dissimilar	2.67	.48	1.81	.49
Familiar	3.74	.49	3.5	.5
Unfamiliar	3.4	.49	2.89	.5

5.3.3.6.3. Univariate Effects of Familiarity/Similarity Condition on Competence.

There was a significant interaction between condition and time on competence, $F(3, 193) = 15.09$, $p < .001$, $\eta_p^2 = .19$ (large-sized). **Agreeing with H2b:** *Post hoc* pairwise comparisons revealed the similar condition significantly increased competence from pre-manipulation to post-manipulation, $p < .001$, $d = .79$ (medium-sized). Additionally, the dissimilar condition significantly decreased competence from pre-manipulation to post-manipulation, $p = .001$, $d = .47$ (small-sized). Post-manipulation only, participants in the similar condition perceived the animal to be more competent than participants in the dissimilar condition, $p < .001$, $d = .98$ (large-sized), an effect not present pre-manipulation, $p = 1$. Participants in the similar condition also viewed animals as being more competent post-manipulation than participants in the familiar, $p = .02$, $d = .6$ (medium-sized), and unfamiliar, $p = .03$, $d = .58$ (medium-sized), conditions. **Not supporting H1a:** *Post hoc* pairwise comparisons revealed no significant post-manipulation difference in competence between the familiar and unfamiliar conditions, $p = 1$, nor any significant differences in competence from pre- to post-manipulation after exposure to the familiar, $p = .36$, or unfamiliar, $p = .36$, conditions.

Table 18.
Descriptive Statistics for Interaction Effect of Familiarity/Similarity Condition and Time on Competence.

Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Similar	2.67	.45	5.36	.55
Dissimilar	3.1	.44	1.64	.53
Familiar	2.68	.45	3.1	.54
Unfamiliar	3.57	.45	3.15	.54

5.3.3.6.4. Univariate Effects of Familiarity/Similarity Condition on Active Harm.

Not supporting H3a and H4a: There was no significant interaction between condition and time on active harm, $F(3, 193) = .11$, $p = .96$, $\eta_p^2 = .002$.

5.3.3.6.5. Univariate Effects of Familiarity/Similarity Condition on Active Help.[23]

There was a significant interaction between condition and time on active help, $F(3, 193) = 5.15$, $p = .002$, $\eta_p^2 = .07$ (medium-sized). **Partially consistent with H4b:** *Post hoc* pairwise comparisons found that participants in the similar condition expressed significantly greater active help post-manipulation compared to pre-manipulation, $p < .001$, $d = .43$ (small-sized). **Partially not supporting H4b:** Participants in the similar condition did not express significantly greater post-manipulation active help than participants in the dissimilar condition, $p = .14$. Participants in the similar condition did, however, show significantly greater post-manipulation active help than participants in the unfamiliar condition, $p = .01$, $d = .67$ (medium-sized), but not more than participants in the familiar condition, $p =.23$. Unlike above effects on warmth and competence, participants in the dissimilar condition did not significantly differ in active help from pre-manipulation to post-manipulation, $p = .4$. **Not supporting H3b:** *Post hoc* pairwise comparisons found no significant post-manipulation

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[23] When excluding univariate outliers, *post hoc* pairwise comparisons for the interaction between condition and time interaction on active help revealed a significant post-manipulation difference in active help between the similar (M=8.19, SE=.72) and dissimilar conditions (M=5.57, SE=.66), $p = .049$, $d = .54$ (medium-sized).

difference in active help between the familiar and unfamiliar conditions, $p = .23$, nor any significant differences from pre- to post-manipulation after exposure to the familiar, $p = .55$, or unfamiliar, $p = .25$, conditions.

Table 19.
Descriptive Statistics for Interaction Effect of Familiarity/Similarity Condition and Time on Active Help.

Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Similar	5.86	.65	7.78	.69
Dissimilar	6	.63	5.58	.67
Familiar	6.9	.64	6.59	.68
Unfamiliar	5.15	.65	4.55	.69

5.3.3.6.6. Univariate Effects of Familiarity/Similarity Condition on Passive Harm.[24]

Not supporting H3c and H4c: There was no significant interaction between condition and time on passive harm, $F(3, 193) = 1.25$, $p = .29$, $\eta_p^2 = .02$.

5.3.3.6.7. Univariate Effects of Familiarity/Similarity Condition on Passive Help.

There was a significant interaction between condition and time on passive help, $F(3, 193) = 4.38$, $p = .01$, $\eta_p^2 = .06$ (medium-sized). **Partially consistent with H4d:** *Post hoc* pairwise comparisons found that participants in the similar condition showed significantly greater passive help post-manipulation compared to pre-manipulation, $p = .01$, $d = .33$ (small-sized). **Partially not supporting H4d:** Participants in the similar condition did not demonstrate significantly greater post-manipulation passive help than participants in the dissimilar condition, $p = 1$. Unlike above effects on warmth and competence, participants in the dissimilar condition did not significantly differ in passive help from pre-manipulation to post-manipulation, $p = .37$. **Not supporting H3d:** *Post hoc* pairwise comparisons found that,

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[24] When excluding univariate outliers, condition had a significant effect on passive harm, $F(3, 181) = 5.08$, $p = .002$, $\eta_p^2 = .08$ (medium-sized). However, this effect did not interact with time, $F(3, 181) = 1.42$, $p = .24$, $\eta_p^2 = .02$, indicating this finding may be due to randomly occurring differences between groups only.

for participants within the familiar condition, passive help significantly decreased from pre-manipulation to post-manipulation, *p* = .02, *d* = .33 (small-sized). That is, participants were less likely to passively help the animal after being exposed to the familiarity manipulation, which was the opposite direction to predicted. There was no significant difference in passive help from pre- to post-manipulation for participants within the unfamiliar condition, *p* = .84, nor any significant post-manipulation difference in passive help between participants in the familiar and unfamiliar conditions, *p* = 1.

Table 20.
Descriptive Statistics for Interaction Effect of Familiarity/Similarity Condition and Time on Passive Help.

Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Similar	2.69	.4	3.54	.42
Dissimilar	3.53	.39	3.26	.4
Familiar	3.9	.4	3.15	.41
Unfamiliar	3.14	.4	3.08	.42

5.3.3.7. Testing if Warmth/Competence Perceptions and Behavioural Intentions Towards the Animal Differ from Zero.

Twelve one-tailed one-sample *t*-tests were conducted on warmth, competence, active help, active harm, passive help, and passive harm at pre- and post-manipulation to test if perceptions of, and behavioural intentions towards, animals significantly differ from zero. These one-sample *t*-tests revealed that all perceptions and behavioural intentions significantly differed from zero, *p*s < .001, whereby the animal was deemed warmer and more competent than zero across timepoints. Additionally, participants were more willing to actively and passively help, and less willing to actively and passively harm, the animal compared to zero. Like Study 3, these findings indicate a positivity bias towards the unknown animal.

5.3.3.8. Testing H5-H8: Exploring Mediational Relationships Between Familiarity/Similarity and Behavioural Intentions Through Warmth and Competence.

Per the BIAS map, I predicted post-manipulation warmth would mediate the relationship between familiarity and post-manipulation active harm (**a**) and post-manipulation active help (**b**; **H5**). I also hypothesised post-manipulation warmth would mediate the relationship between similarity and post-manipulation active harm (**a**) and post-manipulation active help (**b; H6**). I predicted post-manipulation competence would mediate the relationship between familiarity and post-manipulation passive harm (**a**) and post-manipulation passive help (**b**; **H7**). Finally, I hypothesised post-manipulation competence would mediate the relationship between similarity and post-manipulation passive harm (**a**) and post-manipulation passive help (**b; H8**).

To test **H5-H8**, I dummy coded familiarity and similarity into two separate dummy variables, with familiarity coded as unfamiliar (zero) and familiar (one), and similarity coded as dissimilar (zero) and similar (one). Eight individual boot-strapped mediation analyses (10,000 bootstrap samples) were run using Model 4 in PROCESS through SPSS (Hayes, 2022) to assess mediational relationships for the four behavioural intentions with two dummy variables (familiarity and similarity). To control for Type I error from multiple mediation testing, I utilised an adjusted confidence interval of 99%. Significant mediations are interpreted through confidence intervals which do not contain zero per Hayes (2018).

As post-manipulation warmth and post-manipulation competence were significantly correlated with each other within the current study as revealed through a Pearson correlation, $r = .69$, $p < .001$, and warmth and competence are conceptually related, warmth and competence were included as parallel mediators within the below mediation analyses. Inclusion of warmth and competence as parallel mediators allows for testing of any mediational roles of warmth for active behavioural intentions *whilst* controlling for competence, and any mediational roles of competence for passive behavioural intentions *whilst* controlling for warmth (Hayes, 2018).

5.3.3.8.1. H5a: Mediation of Familiarity on Active Harm through Warmth.

Not supporting H5a: There was no significant indirect effect of familiarity on post-manipulation active harm through post-manipulation warmth when controlling for post-manipulation competence, $b = -.2$, $SE = .33$, 99% CI [-1.34, .65]. That is, post-manipulation warmth did not significantly mediate the relationship between familiarity and post-manipulation active harm. Inspection of path *b* indicated post-manipulation warmth did not significantly predict post-manipulation active harm, $b = -.41$, $SE = .21$, $p = .053$, 99% CI [-.95, .14].

5.3.3.8.2. H5b: Mediation of Familiarity on Active Help through Warmth.

Not supporting H5b: There was no significant indirect effect of familiarity on post-manipulation active help through post-manipulation warmth when controlling for post-manipulation competence, $b = .33$, $SE = .47$, 99% CI [-1.07, 1.75]. That is, post-manipulation warmth did not significantly mediate the relationship between familiarity and post-manipulation active help. Inspection of path *b* indicated greater post-manipulation warmth significantly predicted greater post-manipulation active help, $b = .66$, $SE = .17$, $p < .001$, 99% CI [.22, 1.11].

5.3.3.8.3. H6a: Mediation of Similarity on Active Harm through Warmth.

Not supporting H6a: There was no significant indirect effect of similarity on post-manipulation active harm through post-manipulation warmth when controlling for post-manipulation competence, $b = -.27$, $SE = .36$, 99% CI [-1.35, .72]. Thus, post-manipulation warmth did not significantly mediate the relationship between similarity and post-manipulation active harm. Inspection of path *b* indicated post-manipulation warmth did not significantly predict post-manipulation active harm, *b* = -.11, *SE* = .15, *p* = .45, 99% CI [-.5, .28].

5.3.3.8.4. H6b: Mediation of Similarity on Active Help through Warmth.

Agreeing with H6b: There was a significant indirect effect of similarity on post-manipulation active help through post-manipulation warmth when controlling for post-manipulation competence. Thus, post-manipulation warmth significantly mediated the relationship between similarity and post-manipulation active help (Figure 8). This model explained 32.9% of variance in post-manipulation active help (R^2 = .329). Additionally, inspection of path *b* indicated greater post-manipulation warmth significantly predicted greater post-manipulation active help (Figure 8).

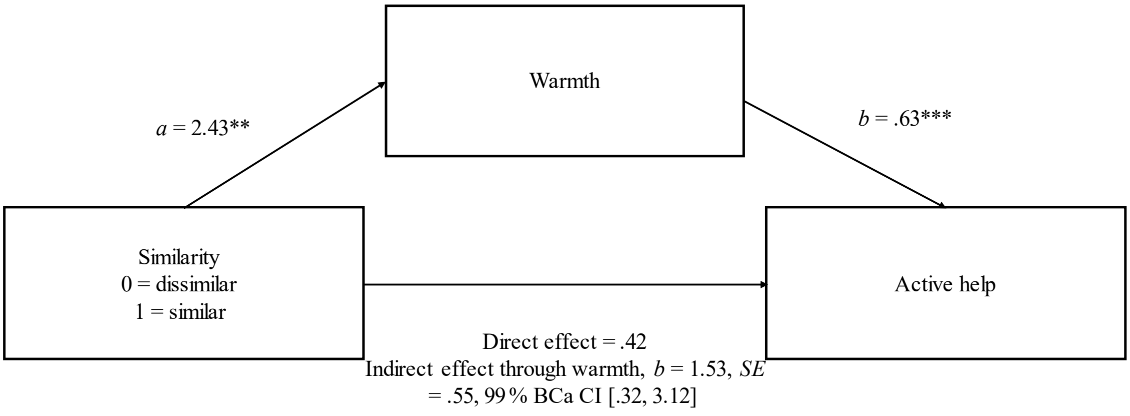

Figure 8. Mediational model of similarity on post-manipulation active help through post-manipulation warmth when controlling for post-manipulation competence. *Note:* Standard error is reported for indirect effect only. ***p*<.01 ****p*<.001

5.3.3.8.5. H7a: Mediation of Familiarity on Passive Harm through Competence.

Not supporting H7a: There was no significant indirect effect of familiarity on post-manipulation passive harm via post-manipulation competence when controlling for post-manipulation warmth, *b* = .01, *SE* = .07, 99% CI [-.24, .28]. Therefore, post-manipulation competence did not significantly mediate the relationship between familiarity and post-manipulation passive harm. Inspection of path *b* indicated post-manipulation competence did not significantly predict post-manipulation passive harm, *b* = -.06, *SE* = .1, *p* = .54, 99% CI [-.31, .19].

5.3.3.8.6. H7b: Mediation of Familiarity on Passive Help through Competence.

Not supporting H7b: There was no significant indirect effect of familiarity on post-manipulation passive help via post-manipulation competence when controlling for post-manipulation warmth, *b* = -.06, *SE* = .24, 99% CI [-.81, .6]. Therefore, post-manipulation competence did not significantly mediate the relationship between familiarity and post-manipulation passive help. Inspection of path *b* indicated greater post-manipulation competence significantly predicted greater post-manipulation passive help, *b* = .33, *SE* = .1, *p* = .001, 99% CI [.07, .58].

5.3.3.8.7. H8a: Mediation of Similarity on Passive Harm through Competence.

Not supporting H8a: There was no significant indirect effect of similarity on post-manipulation passive harm via post-manipulation competence when controlling for post-manipulation warmth, *b* = -.08, *SE* = .22, 99% CI [-.77 .51]. Therefore, post-manipulation competence did not significantly mediate the relationship between similarity and post-manipulation passive harm. Inspection of path *b* indicated post-manipulation competence did not significantly predict post-manipulation passive harm, *b* = -.02, *SE* = .07, *p* = .74, 99% CI [-.2, .16].

5.3.3.8.8. H8b: Mediation of Similarity on Passive Help through Competence.

Not supporting H8b: There was no significant indirect effect of similarity on post-manipulation passive help via post-manipulation competence when controlling for post-manipulation warmth, *b* = .31, *SE* = .32, 99% CI [-.53 1.24]. Thus, post-manipulation competence did not significantly mediate the relationship between similarity and post-manipulation passive help. Inspection of path *b* indicated post-manipulation competence did not significantly predict post-manipulation passive help, *b* = .09, *SE* = .09, *p* = .32, 99% CI [-.14, .31].

5.3.4. Discussion

5.3.4.1. Discussion of Findings.

5.3.4.1.1. H2 and H4: Effects of Similarity on SCM/BIAS Map Variables.

As expected, and aligning with previous literature (Batt, 2009; Westbury & Neumann, 2008), similarity was superior to the dissimilarity condition in causing greater post-manipulation warmth (medium-sized; **H2a**) and post-manipulation competence (large-sized; **H2b**), and similarity increased warmth (small-sized; **H2a**), competence (medium-sized; **H2b**), active help (small-sized; **H4b**), and passive help (small-sized; **H4d**) from pre- to post-manipulation. That is, animals described as similar (vs. dissimilar) were deemed warmer and more competent post-manipulation. Furthermore, animals merely being described as similar increased their warmth and competence, and active help and passive help towards them, from pre- to post-manipulation. Additionally, dissimilarity caused participants to view animals as lower in warmth and competence from pre- to post-manipulation (small-sized). Thus, within this study, similarity has two-pronged effects on the warmth and competence of unknown animals: A positive effect of similarity and a negative effect of dissimilarity. Whilst previous research has focussed on the benefits conferred by similarity (Batt, 2009; Westbury & Neumann, 2008), negative effects of dissimilarity on perceptions of animals have not yet been explored. Thus, the current study uniquely highlights this negative role of dissimilarity on perceptions of unknown animals (warmth, competence). Some effects are small-sized only, so may have lower practical significance.

Unlike for warmth and competence, similarity was not superior to the dissimilarity condition for post-manipulation active and passive help, not supporting **H4b** and **H4d**. Thus, although similarity increased active and passive help towards animals from pre- to post-manipulation, the similar condition did not increase post-manipulation active and passive help over the dissimilar condition. For active help, this finding may be due to univariate outliers, as excluding univariate outliers led to the similar condition causing greater post-manipulation active help than the dissimilar condition (medium-sized; Footnote 23). Alternatively, the effect of similarity on help intentions from pre- to post-manipulation may not have been strong enough alone to differentiate post-manipulation help intentions in the similar and dissimilar conditions. Indeed, the post-manipulation differences in warmth and competence between the similar (vs. dissimilar) conditions may have arisen from the combined positive effect of similarity and negative effect of dissimilarity on warmth and competence from pre- to post-manipulation. There was no such negative effect of dissimilarity on active and passive help from pre- to post-manipulation, which may thus explain the lack of post-manipulation differences between the similar (vs. dissimilar) condition on help intentions found here. Passive help findings should be interpreted with caution due to inadequate scale reliability.

The lack of effects of similarity on active and passive harm within this study indicate effects of similarity on warmth, competence, and help intentions may not extend to harm intentions towards unknown animals, not supporting **H4a** and **H4c** (although the null findings for active and passive harm should be interpreted with caution due to inadequate scale reliability [passive harm] or floor effects [active harm]). Whilst the finding for active harm may be due to floor effects (i.e., regardless of similarity, participants were averse to actively harming animals), similarity may also simply not inform harm intentions towards unknown animals. That is, harm intentions towards unknown animals may be typically extremely low and robust to change, whilst perceptions of animals (warmth, competence) and help intentions towards them may be more pliable to change following similarity information. Thus, these null findings of similarity on harm intentions may indicate separability between SCM perceptions of unknown animals (e.g., warmth, competence) and BIAS map behavioural intentions towards them (e.g., active harm, passive harm).

5.3.4.1.2. H1 and H3: Effects of Familiarity on SCM/BIAS Map Variables.

Hypotheses for familiarity (**H1a-H1b, H3a-H3d**), which predicted positive effects of familiarity, may not be supported by current findings. Specifically, results were mostly null effects, alongside an unexpected effect of familiarity on passive help (small-sized) in the opposite direction to predicted. That is, familiarity unexpectedly reduced passive help from pre- to post-manipulation, contrary to **H3d,** whereby participants were less likely to passively help the animal after being exposed to the familiarity manipulation. However, this effect was only small-sized, so may have lower practical significance, and passive help findings should be interpreted with caution due to inadequate scale reliability. The null or unexpected findings do not support previous literature (Auger & Amiot, 2019b), which suggest familiarity through imagined contact would be beneficial in improving humans' relationship to animals, and therefore encourage positive behavioural intentions towards them.

The null findings observed in this study may be due to ineffectiveness of the familiarity manipulation (i.e., the text failed to manipulate familiarity), despite the new amendments implemented within this study following Pilot Study 1b. For instance, Auger and Amiot's (2019b) imagined contact scenario used positive wording (e.g., '*friendly contact with a dog*'). Conversely, the current study only used neutral wording ('*please now imagine meeting and interacting with the animal in the photograph*') to avoid confounding effects of positivity on perceptions of animals. However, this lack of positive wording may have led to the text not successfully manipulating familiarity, whereby imagined contact may need to be positive to improve perceptions of animals (Auger & Amiot, 2019b).

The lack of positive wording may also explain the unexpected small-sized effect of the familiarity manipulation on passive help. That is, because imagined contact was not explicitly worded as friendly, participants may have viewed the contact as negative, especially as the animal is wild and unfamiliar, which may have in turn reduced passive help. Indeed, inspection of the texts provided within the description task accompanying the imagined contact scenario indicated many participants viewed the interaction as dangerous for themselves (i.e., the animal may be dangerous or carry disease) or the animal (i.e., the animal is timid and needs to be left alone). As perceived harmfulness of animals causes people to view them more negatively (Piazza et al., 2014), the imagined contact may have inadvertently caused participants to reflect on the animals' possible dangerous nature, and hence reduced passive help. Recognising the above limitations of the familiarity manipulation, future research should therefore implement positive wording and check effectiveness of this wording by asking participants to rate whether the imagined contact was positive, negative, or neutral, and emphasise the animal is not dangerous.

The familiarity manipulation may also have been ineffective in manipulating familiarity due to the manipulation check employing an explicit measure (within the participant's control and awareness, e.g., self-report), instead of an implicit measure (outside of the participant's control and awareness, e.g., reaction time). Recent research (Cerrato & Forestell, 2022) indicates imagined contact with a calf (vs. kitten or child) reduces implicit desire for beef and other types of meat (as measured via a forced-choice food task), but not explicit desire (as measured via self-reported willingness to consume and perceived pleasantness of the food). Thus, familiarity through imagined contact may not inform explicit judgements of warmth, competence, and most behavioural intentions, but may inform implicit judgements. Implicit measures like the Implicit Association Test are effective when applied to warmth and competence (Carlsson & Björklund, 2010), and could therefore be implemented within future research to contrast effects of imagined contact with animals on explicit and implicit SCM/BIAS map measures.

Alternatively, familiarity could be manipulated via texts which do not implement imagined contact. For example, familiarity may be increased through the mere exposure effect (Zajonc, 1968), whereby mere exposure to a stimulus increases liking for that stimulus. As the mere exposure effect increases liking for multiple types of stimuli (Bornstein & D’Agostino, 1992), repeated exposure to an animal would theoretically increase liking, reflected in improved perceptions of and behavioural intentions towards the animal. I therefore test this alternative familiarity manipulation using the mere exposure effect in Pilot Studies 2b, 3b and 4b (Sections 6.2 to 6.4).

5.3.4.1.3. H5-H8: Mediational Relationships Between Familiarity/Similarity and Behavioural Intentions Through Warmth/Competence.

Mediation analyses supported only one mediational hypothesis (**H6b**). That is, as expected and aligning with previous literature on the BIAS map with animals (Sevillano & Fiske, 2016b), post-manipulation warmth mediated the relationship between similarity and post-manipulation active help (**H6b**), whereby similarity caused greater post-manipulation warmth, which in turn predicted greater post-manipulation active help. All other hypotheses (**H5, H6a**, **H7**, **H8**) may not be supported by the mediation analyses due to null indirect effects. For instance, warmth did not mediate the relationship between familiarity and post-manipulation active help and post-manipulation active harm (**H5**). There was also no significant mediation between similarity and post-manipulation active harm through post-manipulation warmth (**H6a**). Additionally, post-manipulation competence did not mediate the relationship between familiarity and post-manipulation passive help and post-manipulation passive harm (**H7**). Finally, post-manipulation competence did not mediate the relationship between similarity and post-manipulation passive help and post-manipulation passive harm (**H8**). These findings therefore indicate a) warmth and competence do not mediate relationships between familiarity and behavioural intentions, b) warmth does not mediate relationships between similarity and harm intentions, and c) competence does not mediate relationships between similarity and behavioural intentions. These null mediations may be arising from lack of effects of familiarity on most DVs (due to the failed familiarity manipulation) and lack of effects of similarity on harm intentions found within the main analyses as discussed in Sections 5.3.4.1.1 and 5.3.4.1.2.

5.3.4.1.4. Extension of Warmth/Competence to Behavioural Intentions.

Despite the lack of indirect mediation effects discussed above, significant *b* pathways revealed that greater warmth consistently predicted greater active help within the familiarity and similarity mediation analyses, although warmth did not predict active harm in either the similarity or familiarity mediation analysis. Additionally, whilst greater competence did predict greater passive help within the familiarity mediation analysis, competence did not predict passive help in the similarity mediation analysis, and competence did not predict passive harm in either the similarity or familiarity mediation analysis. Therefore, the BIAS map as applied to animals (Sevillano & Fiske, 2016b) is only partially supported, whereby warmth consistently predicts greater active help.

5.3.4.1.5. Warmth/Competence Perceptions and Behavioural Intentions Towards the Animal Differ from Zero.

Like Study 3, the unknown animal here was deemed significantly warmer and more competent than zero. Additionally, participants were significantly more willing to actively or passively help, and significantly less willing to actively or passively harm, the animal compared to zero. Thus, the current study combines with Study 3 to evidence a positivity bias in perceptions of and behavioural intentions towards animals, including an animal unknown to participants.

5.3.4.2. Limitations of the Current Study and Directions for Future Research.

The current study has some limitations, which are addressed in subsequent pilot studies (Pilot Studies 2b, 3b and 4b; Sections 6.2. to 6.4.) and/or Study 5: a) lack of effectiveness of the familiarity manipulation, and b) lack of applicability to other animals.

Firstly, as the familiarity manipulation failed, causal effects of familiarity on perceptions of and behavioural intentions towards animals cannot be fully ascertained. Thus, any role of familiarity in causing pet speciesism is difficult to determine, as null effects may be due to familiarity genuinely not causing pet speciesism, or due to familiarity not being effectively manipulated. Due to this failed familiarity manipulation, I instead test an alternative familiarity intervention within Pilot Studies 2b, 3b and 4b, which implements repeated photographs of the target animal, in line with the mere exposure effect (Zajonc, 1968).

Secondly, the current study (like Studies 2 and 6) applies only to perceptions of (predominantly) tree kangaroos, alongside fossas and tamanduas. As perceptions of different species vary widely (López-Cepero et al., 2021, Sevillano & Fiske, 2016b), current findings are encouraging for possible interventions (e.g., a robust effect on active help), but may apply to perceptions of (mostly) tree kangaroos only. Thus, effects of similarity found here do not necessarily apply to perceptions of different species, including dogs and pigs. I therefore test causal effects of similarity on perceptions of dogs and pigs in Study 5, to determine if similarity causes pet speciesism.

5.3.4.3. Conclusion.

The current study uniquely demonstrates the causal role of similarity in informing perceptions of and behavioural intentions towards animals, whereby similarity of unknown animals increased their warmth and competence, and enhanced help intentions towards them (although the effect on passive help may not be robust due to inadequate scale reliability). As similarity had robust effects on warmth, competence and active help, similarity may play a role in causing pet speciesism (tested in Study 5). The study also deviates from some previous literature by demonstrating the limitations of imagined contact with animals. Imagined contact may have failed to elicit greater familiarity due to lack of positive wording for the imagined contact, presumed dangerousness of the animal, or due to use of explicit instead of implicit measures to check effectiveness of the text in manipulating familiarity. This failed imagined contact manipulation may then explain why familiarity did not inform perceptions of and behavioural intentions towards animals, or alternatively familiarity may simply not inform perceptions of and behavioural intentions towards animals. The current study therefore has inconclusive findings on whether familiarity plays a causal role in pet speciesism.

Overall, the current study only supports limited extension of the BIAS map from SCM (e.g., warmth informing active help, but not warmth informing active harm or competence informing passive behavioural intentions). This study has limitations including its measurement of familiarity and applicability to unknown animals only. Due to these limitations, I conduct subsequent pilot studies (Pilot Studies 2b, 3b and 4b; Sections 6.2. to 6.4.) to test an alternative manipulation of familiarity via the mere exposure effect, and I investigate causal effects of similarity on perceptions of and behavioural intentions towards dogs and pigs specifically (Study 5).

5.4. Overall Discussion

Through a pilot study, a similarity manipulation was developed and piloted which successfully manipulates similarity, whilst a familiarity manipulation was found to be unsuccessful in manipulating familiarity. As such, the similarity manipulation was implemented unchanged within Study 4, whilst the familiarity manipulation was implemented with changes within Study 4, to test if similarity and familiarity are causes of pet speciesism. Overall, Study 4 found that similarity causally informs perceptions of and help intentions towards animals, whilst familiarity failed to have any effects on perceptions of and behavioural intentions towards animals, perhaps due to the manipulation being unsuccessful in manipulating familiarity. These findings are extended within the next chapter through three further pilot studies to test an alternative familiarity manipulation, and through an additional main study testing causal effects of similarity on perceptions of and behavioural intentions towards dogs and pigs specifically (Study 5).

Chapter 6. Pilot Studies for Familiarity and Study 5 Exploring Similarity

6.1. Introduction

The current chapter first presents three pilot studies (Pilot Study 2b, 3b, 4b) to develop and pilot an alternative familiarity manipulation following the unsuccessful familiarity manipulation in Pilot Study 1b and Study 4. This chapter then applies similarity to dogs and pigs specifically within Study 5, to see if similarity is a cause of pet speciesism. These studies are now reported in turn below.

6.2. Pilot Study 2b to Test Amended Familiarity Manipulation

6.2.1. Introduction

Due to the previous familiarity manipulation failing to effectively manipulate familiarity, the current pilot study aims to test and pilot an alternative familiarity manipulation developed by the current researcher. Specifically, familiarity is now manipulated through the mere exposure effect (Zajonc, 1968) rather than imagined contact, whereby participants view nine photographs of the target animal (familiar condition) vs. nine photographs of trees which act as the control (unfamiliar condition). As with Studies 2-3, an unknown animal (tree kangaroo) is utilised as the target animal, as an adapted version of the novel animal paradigm to assess unmoderated effects of familiarity. To check effectiveness of the familiarity manipulation (manipulation check), the item '*How familiar do you perceive the species in the previous photograph to be to you?*' is included to measure familiarity. In line with the mere exposure effect (Zajonc, 1968), I hypothesise that:

H1: Viewing photographs of an animal (vs. control) will significantly increase measured familiarity of the animal.

Note that this pilot study utilises the same participant sample to also pilot manipulations for behavioural and subjective self-relevance, but only information relevant to the familiarity manipulation is reported within the current chapter (see Section 4.3. for pilot study information about the behavioural and subjective self-relevance manipulations [Pilot Study 2a]).

6.2.2. Methods

6.2.2.1. Participants.

Sixty participants were recruited via social media and Sona as a volunteer sample. Nineteen participants were excluded for providing partial data, and 11 participants were excluded for not consuming meat, meaning that all remaining participants were meat consumers only. As all participants stated they were either a man or woman, no participants had to be excluded to enable gender to be dummy coded for inclusion of gender as a covariate (see Section 6.2.3. for further discussion). Exclusions left a total sample size of 30 participants (50% women, 50% men; M_{age}=25.7, SD_{age}=6.87, age range: 18-50), which exceeds the recommend 12 participants per condition for pilot studies (Julious, 2005). Participants within each condition are shown in Table 21. Demographics of the sample are reported as follows in percentages. For nationality: 46.7% (United Kingdom/British), and 3.3% each (Australian, Canadian, Croatian, dual Dutch/Norwegian, Finnish, French, German, Greek, Israeli, Italian, Japanese, Lithuanian, Malaysian, Spanish, Taiwanese, United States). For ethnicity: 63.2% (White), 19.9% (Asian), 10% (Black), and 6.6% (mixed). For country of residence (M_{duration}=16.44, SD_{duration}=9.98, range: 9 months to 35 years): 63.3% (United Kingdom), 6.7% (Malaysia), and 3.3% each (Croatia, Finland, France, Germany, Greece, Hong Kong, Israel, no response, and Norway). For religion: 33.3% (atheism), 23.3% (Christianity), 13.3% each (agnosticism, would rather not say), 6.7% (no response), and 3.3% each (Hinduism, Islam, Judaism).

Table 21.

Participants Within Each Condition for Pilot Study 2b.

Familiarity Condition	Number of Participants
Familiar	15
Unfamiliar	15

6.2.2.2. Design.

The current pilot study follows a 2(familiarity: familiar vs. unfamiliar; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed ANCOVA design on measured familiarity. Familiarity was included as a DV to test effectiveness of the manipulation. Gender and neutrality were included as covariates (see Section 6.2.3. for further discussion).

6.2.2.3. Materials.

6.2.2.3.1. Target Animal and Initial Animal Photograph.

The current pilot study employed the same initial photograph of the tree kangaroo as Studies 2-4, whereby this image was sourced from https://www.shutterstock.com/image-photo/close-shot-cute-tree-kangaroo-168261035. This photograph enables easier visualisation of the imagined scenario and reduces biased perceptions of the animal due to species name.

6.2.2.3.2. Familiarity Manipulation.

Familiarity was manipulated through the mere exposure effect (Zajonc, 1968), whereby participants were first informed that '*you will now see several photographs over the following pages. Each photograph will automatically move to the next photograph after 1 second',* and then either viewed nine photographs of the target animal (familiar condition) or nine photographs of trees (unfamiliar condition; control). Trees were chosen as a matched control as they relate to nature and are living beings, like the target animal, yet will not increase familiarity with the target animal. Nine photographs were utilised in line with mere exposure effect literature, whereby the mere exposure effect starts to reduce after 10 or more exposures (Bornstein, 1989). Each photograph was shown for one second each, in line with mere exposure effect research (Bornstein, 1989; Montoya et al., 2017). After one second of viewing each image, the page automatically advanced.

6.2.2.3.3. Measured Familiarity (Manipulation Check).

Familiarity was measured via the single item developed by the researcher: ‘*How familiar do you perceive the species in the previous photograph to be to you?’* on a zero (‘*not familiar at all*’) to 100 (‘*extremely familiar*’) visual analogue scale. A higher score indicates greater familiarity.

6.2.2.3.4. Perceived Neutrality Towards the Animal.

Perceived neutrality was included as a covariate to account for bias and preconceptions in perceptions of the target animal. Due to lack of a pre-existing scale to measure perceived neutrality towards the animal, perceived neutrality was measured via a single item developed by the researcher: ‘*How neutral do you perceive the species in the previous photograph to be?*’ on a visual analogue scale from zero (‘*not neutral at all*’) to 100 (‘*most definitely neutrality’*). Neutrality was defined as ‘*By neutral, we mean how non-biased you believe your opinions of the species are. Higher scores mean less bias, whilst lower scores mean more bias*’. A higher score indicates higher neutrality and less bias.

6.2.2.4. Procedure.

Participants were recruited via social media and Sona. The experiment was conducted in July 2021 as a voluntary, open survey. After providing informed consent, participants were asked if they recognised tree kangaroos, alongside a photograph of the animal. The study either proceeded using the tree kangaroo as the target animal, or, if participants recognised the tree kangaroo, they were redirected towards the end of the study and did not participate further.

Following initial recognition stage, participants provided demographics and stated their perceived neutrality towards the animal and their initial familiarity with the animal. Participants then completed the two sections (self-relevance, familiarity) of the pilot study in a randomised order. Here, only the familiarity section is described (see Section 4.3. for description of the self-relevance section). For the familiarity section, participants were randomly allocated to see nine images either of the target animal or of trees. After viewing the images, participants then again rated their familiarity with the animal. Finally, participants had the chance to report technical difficulties and provide any final comments about the study, before being debriefed. Two participants reported technical difficulties, but their responses were complete and maintained within analyses.

6.2.3. Analyses

A 2(familiarity: familiar vs. unfamiliar; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed ANCOVA, including gender and neutrality as covariates, was conducted on measured familiarity, to test if the manipulation effectively manipulates familiarity. Gender was again included as a covariate within this ANCOVA. Although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analysis by controlling for and partialling out any relationship between gender and the outcome variable (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and measured familiarity (the outcome variable) to be statistically controlled for. Neutrality was also included within the analysis as a covariate to account for bias in perceptions of animals. That is, by including neutrality as a covariate, the statistical model is then adjusted to account for this variable, thereby reducing variability and bias in the findings

(Keen & Tiemeier, 2022), and increasing power of the analysis by statistically controlling for any possible relationship between neutrality and familiarity (Tabachnick & Fidell, 2014).

6.2.3.1. Statistical Assumptions to Test H1: Exploring Effects of Familiarity Manipulation on Measured Familiarity (2x2 ANCOVA).

Measured familiarity mostly failed normality tests, $p < .05$, but skewness was acceptable across conditions. There were outliers in measured familiarity in all conditions except the post-manipulation unfamiliar condition. Running the analysis including and excluding these outliers did not change conclusions. I report this ANCOVA including outliers to reflect the unamended dataset. Homogeneity of variances was present, *p*s > .5.

6.2.3.2. Testing H1: Exploring Effects of Familiarity Manipulation on Measured Familiarity.

A 2(familiarity: familiar vs. unfamiliar; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed ANCOVA, including gender and neutrality as covariates, was run on measured familiarity to test **H1. Not supporting H1:** There was no significant main effect of manipulated familiarity on measured familiarity, $F(1, 26) = 1.15$, $p = .29$, $\eta_p^2 = .04$.

6.2.4. Discussion and Conclusion

Not supporting **H1,** the familiarity manipulation had no effect on measured familiarity. This lack of effectiveness may have arisen from technical issues in presentation of the images. Specifically, participants mentioned in comments at the end of the study that the images were not fully visible on the screen, which may therefore have undermined any mere exposure effect. Therefore, Pilot Study 3b re-tests the familiarity manipulation after ensuring the images are clearly and fully visible on each page to overcome this technical issue.

6.3. Pilot Study 3b to Test Amended Familiarity Manipulation

6.3.1. Introduction

Following null effects of the familiarity manipulation on measured familiarity in Pilot Study 2b, the current pilot study aims to re-test this familiarity manipulation after resolving a technical error and ensuring all images are clearly and fully visible on the screen. Therefore, familiarity is again manipulated through the mere exposure effect (Zajonc, 1968), whereby participants view nine photographs of the unknown target animal (familiar condition) vs. nine photographs of trees which act as the control (unfamiliar condition). However, this familiarity manipulation is amended slightly by displaying photographs at the very top of the screen to ensure easy viewing of the photographs, following participant feedback from Pilot Study 2b that the entirety of the photographs were difficult to view. To check effectiveness of the familiarity manipulation (manipulation check), the item '*How familiar do you perceive the species in the previous photograph to be to you?*' is again included to measure familiarity. In line with the mere exposure effect (Zajonc, 1968), I hypothesise that:

H1: Viewing photographs of an animal (vs. control) will significantly increase measured familiarity of the animal.

Note that this pilot study utilises the same participant sample to also pilot a manipulation for behavioural self-relevance, but only information relevant to the familiarity manipulation is reported within the current chapter (see Section 4.4 for pilot study information about the behavioural self-relevance manipulation [Pilot Study 3a]).

6.3.2. Methods

6.3.2.1 Participants.

Fifty-five participants were recruited via social media and Sona as a volunteer sample. Eighteen participants were excluded for providing partial data, and seven participants were excluded for not consuming meat (meaning that all remaining participants were meat consumers only). As all participants stated they were either a man or woman, no participants had to be excluded to enable gender to be dummy coded for inclusion of gender as a covariate (see Section 6.3.3. for further discussion). Exclusions left a total sample size of 30 participants (50% women, 50% men; $M_{\text{age}} = 25.3$, $SD_{\text{age}} = 6.13$, age range: 18-50), which exceeds the recommend 12 participants per condition for pilot studies (Julious, 2005). Participants within each condition are shown in Table 22. Demographics of the sample are reported as follows in percentages. For nationality: 16.7% (United States), 13.3% (British), 6.7% each (Chinese, Colombian, Filipino, French), and 3.3% each (Canadian, Croatian, Czech, Danish, Dutch, Estonian, Indian, Indonesian, Italian, Malaysian, Polish, Swedish, Taiwanese). For ethnicity: 53% (White), 26.5% (Asian), 10% (mixed), and 3.3% each (Black, Hispanic, Latin American). For country of residence (M_{duration}=17.79, SD_{duration}=11.79, range: 1 month to 50 years): 23.3% (United States), 20% (United Kingdom), 10% (France), 6.7% each (Germany, the Philippines), and 3.3% each (Canada, Croatia, Czech Republic, Denmark, Hungary, Indonesia, Malaysia, Poland, Sweden, the Netherlands). For religion: 40% (Christianity), 26.7% (atheism), 10% each (agnosticism, would rather not say), and 3.3% each (Buddhism, Hinduism, Judaism, no religion).

Table 22.

Participants Within Each Condition for Pilot Study 3b.

Familiarity Condition	Number of Participants
Familiar	15
Unfamiliar	15

6.3.2.2. Design.

The current pilot study follows a 2(familiarity: familiar vs. control; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed ANCOVA design on measured familiarity. Familiarity was included as a DV to test effectiveness of the manipulation. Gender and neutrality were included as covariates (see Section 6.3.3. for further discussion).

6.3.2.3. Materials.

6.3.2.3.1. Target Animal and Animal Photograph.

The current pilot study employed the same photograph of the tree kangaroo as Study 2 and Pilot Study 2a, whereby this image was sourced from https://www.shutterstock.com/image-photo/close-shot-cute-tree-kangaroo-168261035. This photograph enables easier visualisation of the imagined scenario and reduces biased perceptions of the animal due to species name.

6.3.2.3.2. Familiarity Manipulation.

Familiarity was again manipulated through the mere exposure effect (Zajonc, 1968), whereby participants were first informed that '*you will now see several photographs over the following pages. Each photograph will automatically move to the next photograph after 1 second'*, and then either viewed nine photographs of the target animal (familiar condition) or nine photographs of trees (unfamiliar condition; control). After one second of viewing each image, the page automatically advanced.

6.3.2.3.3. Measured Familiarity (Manipulation Check).

Familiarity was again measured via the single item developed by the researcher: *'How familiar do you perceive the species in the previous photograph to be to you?'* on a zero ('*not familiar at all*') to 100 ('*extremely familiar*') visual analogue scale. A higher score indicates greater familiarity.

6.3.2.3.4. Perceived Neutrality Towards the Animal.

Perceived neutrality was included as a covariate to account for bias and preconceptions in perceptions of the target animal. Due to lack of a pre-existing scale to measure perceived neutrality towards the animal, perceived neutrality was measured via a single item developed by the researcher: '*How neutral do you perceive the species in the previous photograph to be?*' on a visual analogue scale from zero ('*not neutral at all*') to 100 ('*most definitely neutrality'*). Neutrality was defined as '*By neutral, we mean how non-biased you believe your opinions of the species are. Higher scores mean less bias, whilst lower scores mean more bias*'. A higher score indicates higher neutrality and less bias.

6.3.2.4. Procedure.

Participants were recruited via social media and Sona. The experiment was conducted in September 2021 as a voluntary, open survey. After providing informed consent, participants were asked if they recognised tree kangaroos, alongside a photograph of the animal. The study either proceeded using the tree kangaroo as the target animal, or, if participants recognised the tree kangaroo, they were redirected towards the end of the study and did not participate further.

Following initial recognition stage, participants provided demographics and stated their perceived neutrality towards the animal and their initial familiarity. Participants then completed the two sections (self-relevance, familiarity) of the pilot study in a randomised order. Here, only the familiarity section is described (see Section 4.4. for description of the self-relevance section). For the familiarity section, participants were randomly allocated to see nine images either of the target animal or of trees. After viewing the images, participants then again rated their familiarity with the animal. Finally, participants had the chance to report technical difficulties and provide any final comments about the study, before being debriefed. Three participants reported technical difficulties, but their responses were complete and maintained within analyses.

6.3.3. Analyses

A 2(familiarity: familiar vs. unfamiliar; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed ANCOVA, including gender and neutrality as covariates, was conducted on measured familiarity, to test if the manipulation effectively manipulates familiarity. Gender was again included as a covariate within this ANCOVA. Although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analysis by controlling for and partialling out any relationship between gender and the outcome variable (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and measured familiarity (the outcome variable) to be statistically controlled for. Neutrality was also included within the analysis as a covariate to account for bias in perceptions of animals. That is, by including neutrality as a covariate, the statistical model is then adjusted to account for this variable, thereby reducing variability and bias in the findings (Keen & Tiemeier, 2022), and increasing power of the analysis by statistically controlling for any possible relationship between neutrality and familiarity (Tabachnick & Fidell, 2014).

6.3.3.1. Statistical Assumptions to Test H1: Exploring Effects of Familiarity Manipulation on Measured Familiarity (2x2 ANCOVA).

Measured familiarity failed normality tests at pre-manipulation, *p*s < .05, whilst the normality assumption was met for measured familiarity at post-manipulation, *p*s > .05. However, skewness was acceptable across all conditions. There were outliers in measured familiarity. Running the analysis including and excluding these outliers did not change conclusions. I report this ANCOVA including outliers to reflect the unamended dataset. Homogeneity of variances was not present, *p*s < .5.

6.3.3.2. Testing H1: Exploring Effects of Familiarity Manipulation on Measured Familiarity.

A 2(familiarity: familiar vs. unfamiliar; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed ANCOVA, including gender and neutrality as covariates, was run on measured familiarity to test **H1. Not supporting H1:** There was no significant main effect of manipulated familiarity on measured familiarity, $F(1, 26) = .02$, $p = .9$, $\eta_p^2 = .001$.

6.3.4. Discussion and Conclusion

Not supporting **H1,** the familiarity manipulation again had no effect on measured familiarity, indicating that the lack of effectiveness is not arising from technical issues in presentation of the images. Lack of effectiveness of the familiarity manipulation could instead be due to participants' confusion about exactly what is meant by 'familiar' within the familiarity manipulation check item, and/or could be due to an underpowered sample. Pilot Study 4b therefore re-tests the familiarity manipulation with a larger and sufficiently powered sample per a G*Power power analysis, and includes the following definition of familiarity for participants to read: '*By familiar, we mean a feeling of acquaintance with the species, e.g. based on seeing it and/or learning about its habit and environment, even if it is from this very experiment for the first time. Higher scores mean a feeling of higher familiarity and lower scores mean a feeling of lower familiarity.'*

6.4. Pilot Study 4b to Test Amended Familiarity Manipulation

6.4.1. Introduction

Following null effects of the familiarity manipulation on measured familiarity in Pilot Study 3b, the current pilot study aims to re-test this familiarity manipulation with a larger sample size in case of underpowered analyses, and with an amendment to the familiarity manipulation check item. Therefore, familiarity is again manipulated through the mere exposure effect (Zajonc, 1968), whereby participants view nine photographs of the unknown target animal (familiar condition) vs. nine photographs of trees which act as the control (unfamiliar condition). To check effectiveness of the familiarity manipulation (manipulation check), the item '*How familiar do you perceive the species in the previous photograph to be to you?*' is again included to measure familiarity. However, the following definition for familiarity is also included alongside this manipulation check item, to ensure that participants are clear on what is being meant by 'familiar': '*By familiar, we mean a feeling of acquaintance with the species, e.g. based on seeing it and/or learning about its habit and environment, even if it is from this very experiment for the first time. Higher scores mean a feeling of higher familiarity and lower scores mean a feeling of lower familiarity.*' In line with the mere exposure effect (Zajonc, 1968), I hypothesise that:

H1: Viewing photographs of an animal (vs. control) will significantly increase measured familiarity of the animal.

Note that this pilot study utilises the same participant sample to also pilot a manipulation for behavioural self-relevance, but only information relevant to the familiarity manipulation is reported within the current chapter (see Section 4.5. for pilot study information about the behavioural self-relevance manipulation [Pilot Study 4a]).

6.4.2. Methods

6.4.2.1. Participants.

One-hundred-and-sixty participants were recruited via Prolific as a volunteer sample. Quota sampling was partially used through Prolific's 'balance by sex'[25] option to obtain approximately equal numbers of men and women. Thirty participants were excluded for:

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[25] Prolific does not provide an option to 'balance by gender'.

recognising the tree kangaroo (*n* = 16), taking part in a previous study within this project (*n* = 7), withdrawing from the study (*n* = 5), and not consuming meat (*n* = 2, meaning that all remaining participants were meat consumers only). As all participants stated they were either a man or woman, no participants had to be excluded to enable gender to be dummy coded for inclusion of gender as a covariate (see Section 6.4.3. for further discussion). Exclusions left a total sample size of 130 participants (51.5% women, 48.5% men; $M_{\text{age}} = 24.78$, $SD_{\text{age}} = 7.13$, age range: 18-56), which exceeded the minimum required sample size of 128 per a G*Power *a priori* power analysis for a ANCOVA analysis (medium effect size f=.25, two groups, two covariates, one numerator *df*, α=.05, power = .8). Participants within each condition are shown in Table 23. Demographics of the sample are reported as follows in percentages, with demographic categories which make up less than 2% of the sample being collapsed into 'other'. For nationality: 35.4% (South African), 15.4% (Portuguese), 9.2% (Polish), 5.4% (Italian), 4.6% (Zimbabwean), 3.8% (Hungarian), 3.1% each (British, Mexican), 2.3% (Spanish), and 17.7% other. For ethnicity: 49.5% (White), 34.6% (Black), 6.2% (mixed), 3.8% each (Asian, would rather not say), and 2.1% other. For country of residence (M_{duration}=22.54, SD_{duration}=8.81, range: 3 months to 56 years): 42.3% (South Africa), 15.4% (Portugal), 8.5% (Poland), 6.9% (Italy), 6.1% (United Kingdom), 4.6% (Hungary), 3.1% (Mexico), 2.3% (Spain), and 10.8% other. For religion: 63.8% (Christianity), 19.2% (atheism), 8.5% (agnosticism), 3.8% (would rather not say), and 4.7% other.

Table 23.
Participants Within Each Condition for Pilot Study 4b.

Familiarity Condition	Number of Participants
Familiar	65
Unfamiliar	65

6.4.2.2. Design.

The current pilot study follows a 2(familiarity: familiar vs. control; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed ANCOVA design on measured familiarity. Familiarity was included as a DV to test effectiveness of the manipulation. Gender and neutrality were included as covariates (see Section 6.4.3. for further discussion).

6.4.2.3. Materials.

6.4.2.3.1. Target Animal and Animal Photograph.

The current pilot study employed the same photograph of the tree kangaroo as Study 2 and previous pilot studies, whereby this image was sourced from https://www.shutterstock.com/image-photo/close-shot-cute-tree-kangaroo-168261035. This photograph enables easier visualisation of the imagined scenario and reduces biased perceptions of the animal due to species name.

6.4.2.3.2. Familiarity Manipulation.

Familiarity was again manipulated through the mere exposure effect (Zajonc, 1968), whereby participants were first informed that '*you will now see several photographs over the following pages. Each photograph will automatically move to the next photograph after 1 second',* and then either viewed nine photographs of the target animal (familiar condition) or nine photographs of trees (unfamiliar condition; control). After one second of viewing each image, the page automatically advanced.

6.4.2.3.3. Measured Familiarity (Manipulation Check).

Familiarity was again measured via the single item developed by the researcher: *'How familiar do you perceive the species in the previous photograph to be to you?'* on a zero ('*not familiar at all*') to 100 ('*extremely familiar*') visual analogue scale. However, the following definition of what is meant by 'familiar' was included within the current pilot study alongside the familiarity manipulation check item, to ensure that participants are clear on what is being meant by 'familiar': '*By familiar, we mean a feeling of acquaintance with the species, e.g. based on seeing it and/or learning about its habits and environment, even if it is from this very experiment for the first time. Higher scores mean a feeling of higher familiarity and lower scores mean a feeling of lower familiarity.*' A higher score indicates greater familiarity.

6.4.2.3.4. Perceived Neutrality Towards the Animal.

Perceived neutrality was included as a covariate to account for bias and preconceptions in perceptions of the target animal. Due to lack of a pre-existing scale to measure perceived neutrality towards the animal, perceived neutrality was measured via a single item developed by the researcher: '*How neutral do you perceive the species in the previous photograph to be?*' on a visual analogue scale from zero ('*not neutral at all*') to 100 ('*most definitely neutrality'*). Neutrality was defined as '*By neutral, we mean how non-biased you believe your opinions of the species are. Higher scores mean less bias, whilst lower scores mean more bias*'. A higher score indicates higher neutrality and less bias.

6.4.2.4. Procedure.

Participants were recruited via Prolific. All participants had to be 18+ meat consumers who had not taken part in previous studies within this thesis. The experiment was conducted in November 2021 as a voluntary, open survey open to participants who registered for the study via Prolific. After providing informed consent, participants were asked if they recognised tree kangaroos, alongside a photograph of the animal. The study either proceeded using the tree kangaroo as the target animal, or, if participants recognised the tree kangaroo, they were redirected towards the end of the study and did not participate further.

Following initial recognition stage, participants provided demographics and stated their perceived neutrality towards the animal and their initial familiarity. Participants then completed the two sections (self-relevance, familiarity) of the pilot study in a randomised order. Here, only the familiarity section is described (see Section 4.5. for description of the self-relevance section). For the familiarity section, participants were randomly allocated to see nine images either of the target animal or of trees. After viewing the images, participants then again rated their familiarity with the animal. Finally, participants had the chance to report technical difficulties and provide any final comments about the study, before being debriefed. Two participants reported technical difficulties, but their responses were complete and maintained within analyses.

6.4.3. Analyses

A 2(familiarity: familiar vs. unfamiliar; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed ANCOVA, including gender and neutrality as covariates, was conducted on measured familiarity, to test if the manipulation effectively manipulates familiarity. Gender was again included as a covariate within this ANCOVA. Although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analysis by controlling for and partialling out any relationship between gender and the outcome variable (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and measured familiarity (the outcome variable) to be statistically controlled for. Neutrality was also included within the analysis as a covariate to account for bias in perceptions of animals. That is, by including neutrality as a covariate, the statistical model is then adjusted to account for this variable, thereby reducing variability and bias in the findings (Keen & Tiemeier, 2022), and increasing power of the analysis by statistically controlling for any possible relationship between neutrality and familiarity (Tabachnick & Fidell, 2014).

6.4.3.1. Statistical Assumptions to Test H1: Exploring Effects of Familiarity Manipulation on Measured Familiarity (2x2 ANCOVA).

Measured familiarity failed normality tests across most conditions, ps < .05, but skewness was acceptable across all conditions. There were outliers in measured familiarity at pre-manipulation. Running the analysis including and excluding these outliers did not change conclusions. I report this ANCOVA including outliers to reflect the unamended dataset. Homogeneity of variances was present, ps > .5.

6.4.3.2. Testing H1: Exploring Effects of Familiarity Manipulation on Measured Familiarity.

A 2(familiarity: familiar vs. unfamiliar; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed ANCOVA, including gender and neutrality as covariates, was run on measured familiarity to test **H1. Not supporting H1:** There was no significant main effect of manipulated familiarity on measured familiarity, $F(1, 126) = .75$, $p = .39$, $\eta_p^2 = .01$.

6.4.4. Discussion and Conclusion

Not supporting **H1,** the familiarity manipulation again had no effect on measured familiarity, indicating that the lack of effectiveness of the manipulation is not arising from underpowered analyses and/or participant confusion about what is meant by 'familiar'. Due to this familiarity manipulation failing across three pilot studies, despite amendments, further investigation of familiarity and its possible causal effects of familiarity on perceptions of dogs and pigs was not pursued and cannot be determined within this thesis. However, these failed familiarity manipulations do indicate that imagined contact and the mere exposure effect may not always effectively apply to animals, which does not support previous literature (e.g., Auger & Amiot, 2019b; Cerrato & Forestell, 2022; Zajonc, 1968). As such, the next study (Study 5) only explores *similarity* as a possible cause of pet speciesism and does not explore familiarity.

6.5. Study 5: Applying Similarity to Dogs and Pigs

6.5.1. Introduction and Extension from Studies 1 and 4

Study 4 found that similarity informed warmth and competence of, and active and passive help towards, an unknown animal (tree kangaroo, fossa, tamandua). These effects of similarity mostly agreed with previous literature (Leach et al., 2021), whilst uniquely demonstrating how similarity does not inform harm intentions towards unknown animals. Specifically, these findings indicate that positive effects of similarity found in previous literature (e.g., Batt, 2009; Kozachenko & Piazza, 2021; Leach et al., 2021; Possidónio et al., 2019) extend to the SCM (warmth/competence perceptions) and partially extend to the BIAS map (help intentions) with unknown animals, whereby these positive effects of similarity are theorised to arise from similarity enabling ‘humanisation’ of the similar animal, by encouraging inclusion of the animal within our moral circle, and thereby enhancing moral concern for the animal (Bastian et al., 2012).

The current study aims to extend Study 4 findings applied to the SCM/BIAS map to pet speciesism specifically, by testing causal effects of similarity on warmth/competence perceptions of and behavioural intentions towards dogs and pigs specifically. This finding therefore directly tests if similarity is a cause of pet speciesism: As dogs are deemed more similar to humans than pigs (Study 1), if similarity contributes positively to perceptions of dogs’ warmth and competence and help intentions towards them within this study, then similarity can be considered a cause of pet speciesism across these dimensions. That is, dogs’ greater similarity (compared to pigs) would inform dogs’ greater warmth and competence, and greater help intentions towards dogs, whilst pigs’ lower similarity (compared to dogs) would inform pigs’ lower warmth and competence, and lower help intentions towards pigs.

Similarity is again manipulated through fictional newspaper text describing the target animal as either being similar or dissimilar to humans across four traits (behaviour, level of intelligence, sociality, and emotionality), piloted in Pilot Study 1b (Section 5.2.). However, unlike Study 4, this study does not utilise unknown animals within the similarity manipulation as Study 4 already tested similarity with unknown animals. Warmth, competence, and behavioural intentions are again measured within the current study using the SCM/BIAS map subscales from Sevillano and Fiske (2016b). Following positive effects of similarity on warmth, competence and help intentions from Study 4, and in line with above discussed positive effects of similarity on perceptions of animals from previous research (e.g., Leach et al., 2021), I hypothesise that:

H1: Purportedly similar (vs. dissimilar) dogs will be deemed significantly warmer (**a**) and more competent (**b**).

H2: Similarity of dogs will significantly increase active (**a**) and passive (**b**) help intentions towards dogs from pre- to post-manipulation.

Note, however, that I do not formulate hypotheses for pigs, as people can disregard similarity information about pigs (Piazza & Loughnan, 2016). Specifically, animals deemed more (vs. less) intelligent are usually awarded higher moral status, yet this intelligence information is sometimes disregarded for pigs, whereby (high or low) intelligence of pigs is not used to inform their perceived moral status (Piazza & Loughnan, 2016). However, more recent research has found no evidence for people disregarding similarity information about ‘food’ animals including pigs (Leach et al., 2021), and thus it is currently unclear if and when similarity information about pigs and other ‘food’ animals is disregarded. As such, I do not include pigs within **H1-H2**, and instead any effects of similarity on pigs (including mediations) are investigated for exploratory purposes.

Alongside the above hypotheses, previous pet speciesism research (Bilewicz et al., 2011; Caviola & Capraro, 2020; Gradidge et al., 2021b), SCM/BIAS map research (Sevillano & Fiske, 2016a, 2016b, 2019), and Studies 1 and 3 findings indicate that dogs are viewed more positively than other animals (e.g., pigs), whilst pigs are viewed more negatively than other animals (e.g., dogs). As such, I hypothesise that:

> **H3**: Dogs will be deemed significantly warmer (**a**) and more competent (**b**) than pigs across similarity conditions and timepoints.

Furthermore, due to evidence of pet speciesism in behavioural intentions towards animals as well as perceptions of them (Gradidge et al., 2021a; Study 3 in this thesis), alongside active and passive behavioural intentions towards an animal being informed by the animal's perceived warmth and competence (Sevillano & Fiske, 2016; Sevillano & Fiske, 2019), I predict that differences in warmth/competence perceptions of species will extend to behavioural intentions, such that:

> **H4**: Dogs will be subject to significantly more active (**a**) and passive help (**b**), and less active (**c**) and passive harm (**d**), than pigs across similarity conditions and timepoints.

Finally, inclusion of measurements for behavioural intentions within this study also again enables applicability of the BIAS map to animals to be tested (Sevillano & Fiske, 2016b, 2019). Firstly, it can be tested directly if any effects of *similarity* on active and passive behavioural intentions are mediated through warmth and competence respectively, in line with both general SCM and BIAS map literature (Cuddy et al., 2007) and SCM/BIAS map literature applied to animals specifically (Sevillano & Fiske, 2016b, 2019). I therefore hypothesise that:

H5: Post-manipulation warmth will significantly mediate the relationship between dogs' similarity and active help, per Study 4. That is, dogs portrayed as similar (vs. dissimilar) will be deemed significantly warmer post-manipulation, significantly increasing post-manipulation active help.

H6: Post-manipulation competence will significantly mediate the relationship between dogs' similarity and passive help, per Study 4. That is, dogs portrayed as similar (vs. dissimilar) will be deemed significantly more competent post-manipulation, significantly increasing post-manipulation passive help.

Secondly, it can be tested directly if any effects of *species* on active and passive behavioural intentions are mediated through warmth and competence respectively, in line with both general SCM and BIAS map literature (Cuddy et al., 2007) and SCM/BIAS map literature applied to animals specifically (Sevillano & Fiske, 2016b, 2019). I therefore predict that:

H7: Warmth will significantly mediate relationships between species and active help and active harm across timepoints. That is, dogs will be deemed significantly warmer than pigs, significantly increasing active help (**a**) and decreasing active harm (**b**).

H8: Competence will significantly mediate relationships between species and passive help and passive harm across timepoints. That is, dogs will be deemed significantly more competent than pigs across timepoints, significantly increasing passive help (**a**) and decreasing passive harm (**b**).

6.5.2. Methods

6.5.2.1. Participants.

Two-hundred-and-thirty participants were recruited via Prolific as a volunteer sample. Quota sampling was partially used through Prolific's 'balance by sex' option to obtain approximately equal numbers of men and women. Fifty participants were excluded for: withdrawing their response (*n*=18), indicating their culture and/or religion does not typically view dogs as pets and/or pigs as food (*n*=16), participating in a previous experiment (*n*=6), failing the attention check (*n*=4), providing partial data only (*n*=3), or not consuming meat (*n*=3). All analyses included gender as a covariate (see Section 6.5.3. for further discussion), whereby gender was dummy coded into women (coded as zero; *n*=86) and men (coded as one; *n*=94). However, there were no participants of other genders and thus no further exclusions. Exclusions left a sample of 180 participants (52.2% men, 47.8% women; M_{age}=27.26, SD_{age}=9.09, age range=18-81), which exceeded the minimum required sample size of 179 per a G*Power *a priori* power analysis for a MANOVA analysis ('repeated measures, within-between interaction', medium effect size *f*=.25, four groups, two measurements, α=.05, power = .8). Participants within each condition are shown in Table 24. Demographics of the sample are reported as follows in percentages, with demographic categories which make up less than 2% of the sample being collapsed into 'other'. For nationality: 19.4% (Portuguese), 17.2% (South African), 10% (Polish), 7.8% (Mexican), 6.1% (British), 5% (Chilean), 3.9% (Italian), 2.8% each (Greek, no response), 2.2% each (Estonian, Hungarian, United States), and 18.4% other. For ethnicity: 59.3% (White), 17.8% (Black), 9.8% (mixed), 4.4% (Hispanic/Latino), 3.3% each (Asian, would rather not say), and 2.1% other. For country of residence (M_{duration}=23.97, SD_{duration}=10.13, range: three months to 81 years): 21.1% (South Africa), 19.4% (Portugal), 9.4% (Poland), 8.3% (Mexico), 7.8% (United Kingdom), 5% (Chile), 3.9% (Italy), 2.8% each (Estonia, Greece, United States), 2.2% (Hungary), and 14.5% other. For religion: 47.8% (Christianity), 26.1% (atheism), 17.2% (agnosticism), 6.1% (would rather not say), and 2.8% other.

Table 24.

Participants Within Each Condition for Study 5.

Species	Similarity Condition	Number of Participants
Dog	Similar	44
Pig	Similar	43
Dog	Dissimilar	44
Pig	Dissimilar	49

6.5.2.2. Design.

This experiment follows a 2(similarity: similar vs. dissimilar; between-subjects) x 2(species: dog vs. pig; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed MANCOVA design, with warmth, competence, active help, passive help, active harm, passive harm, perceived similarity to humans, perceived shared emotional traits with humans, and perceived shared cognitive traits with humans as the DVs. Measurements of similarity were included as DVs to test effectiveness of the similarity manipulation. Gender and neutrality were included as covariates (see Section 6.5.3. for further discussion).

6.5.2.3. Materials.

6.5.2.3.1. Animal Photographs.

The current study employed the same dog and pig photographs as Study 3, whereby the dog photograph was sourced from https://www.flickr.com/photos/dave_see/8523607444 and the pig photograph was sourced from https://www.pexels.com/photo/nature-animals-pig-alp-rona-63285/. These photographs were included to enable easier visualisation of the imagined scenario.

6.5.2.3.2. Similarity Text Manipulations.

Similarity was manipulated via the same text manipulations from Study 4. Specifically, participants were asked to '*Imagine reading the following text in the newspaper*', with the following text stating that '*According to animal behaviour experts, the species in the photograph is reportedly similar [similar condition] / dissimilar [dissimilar* *condition] to humans in many ways, including in terms of behaviour, level of intelligence, sociality and emotionality*'.

6.5.2.3.3. Warmth and Competence (Sevillano & Fiske, 2016b).

Warmth and competence were measured with the same items from Studies 1-4: '*warm*', '*well-intentioned*', '*friendly*' (warmth), and '*competent*', '*skillful*', '*intelligent*' (competence; Sevillano & Fiske, 2016b). Like Studies 3-4, these items were measured using a semantic differential from -3 to 3, with higher scores indicating greater warmth or competence. Items within each subscale were summed to provide warmth and competence scores. Reliability was adequate within this study for warmth (pre-manipulation ω=.83, 95% BCa CI [.78, .87]; post-manipulation ω=.89, 95% BCa CI [.84, .92]) and competence (pre-manipulation ω=.89, 95% BCa CI [.85, .92]; post-manipulation ω=.93, 95% BCa CI [.9, .95]) across timepoints.

6.5.2.3.4. Behavioural Intentions Towards the Animal (Sevillano & Fiske, 2016b).

Behavioural intentions were measured with the same items from Studies 2-4: '*support*', '*help*', '*behave friendly towards*', '*interact with*' the animal (active help), '*sustain*', '*conserve*' the animal (passive help), '*kill*', '*injure*', '*exterminate*', '*trap*', '*reject*' the animal (active harm), and '*let the species in the photograph die off*', '*ignore*' the animal (passive harm; Sevillano & Fiske, 2016b). Like Studies 3-4, these items were measured using a semantic differential from -3 to 3 with higher scores indicating greater active help, active harm, passive help, or passive harm. Items within each subscale were summed to provide active help, passive help, active harm, and passive harm scores. Reliability was adequate within this study for active help (pre-manipulation ω=.88, 95% BCa CI [.83, .91]; post-manipulation ω=.91, 95% BCa CI [.87, .94]), and active harm (pre-manipulation ω=.77, 95% BCa CI [.68, .83]; post-manipulation ω=.84, 95% BCa CI [.77, .89]) across timepoints. Whilst reliability was adequate within this study for post-manipulation passive harm

(r_{sb}=.72), reliability was inadequate for pre-manipulation passive harm (r_{sb}=.55) and inadequate for passive help across timepoints (pre-manipulation r_{sb}=.66; post-manipulation r_{sb}=.62). As the passive help and passive harm subscales contain two items, I did not run PAFAs for these subscales. Instead, I retained both items in the subscales, and findings using these subscales should be interpreted with caution due to inadequate reliability at one or both timepoints.

6.5.2.3.5. Perceived Neutrality Towards the Animal.

Neutrality was measured via the same single item utilised in Studies 3-4, with a higher score indicating higher neutrality and less bias: '*How neutral do you perceive the species in the previous photograph to be?*' from zero to 100.

6.5.2.3.6. Perceived Similarity to Humans (Manipulation Check).

Perceived similarity to humans was measured utilising the same single item from Studies 1 and 4 ('*How similar do you perceive the species in the photograph to be to humans?*'), measured on a 0-100 visual analogue scale. A higher score indicates greater perceived similarity to humans.

6.5.2.3.7. Perceived Shared Traits with Humans (Manipulation Check; Bastian et al., 2012a, Bilewicz et al., 2011, Rothgerber, 2014).

Perceived shared traits with humans was measured utilising the same scale from Study 4 (Bastian et al., 2012a; Bilewicz et al., 2011; Rothgerber, 2014) with the following items split into two subscales of emotional capacities and mental capacities: '*nostalgia*', '*happiness*', '*melancholy*', '*excitement*', '*guilt*', '*panic*' (emotional capacities), '*self-control*', '*morality*', '*memory*', '*planning*' (cognitive capacities). Participants answered on a Likert scale from one '*only humans have this capacity*' to seven '*the species in the photograph and humans have this capacity to the same degree*', with the midpoint at four '*the species in the *photograph has this capacity to some degree*'. This measure was used as an additional measure of similarity to validate the perceived similarity to humans manipulation check. Items within each subscale were summed to provide emotional capacity and cognitive capacity scores, with higher scores on each subscale indicating greater shared emotional or cognitive traits with humans. Reliability was adequate within this study across timepoints: emotional capacities (pre-manipulation ω=.73, 95% BCa CI [.64, .8]; post-manipulation ω=.74, 95% BCa CI [.66, .81]) and cognitive capacities (pre-manipulation ω=.73, 95% BCa CI [.64, .8]; post-manipulation (ω=.79, 95% BCa CI [.72, .84]).

6.5.2.4. Procedure.

Participants were recruited via Prolific (Appendix 9). All participants had to be meat consumers who had not taken part in previous studies within this thesis. The experiment was conducted in November and December 2021 as a voluntary survey open to participants who registered for the study via Prolific. After providing informed consent, participants gave demographic information, before being randomised into one of two species conditions (dog vs. pig; their target animal) and viewing a photograph of their target animal. Animal species names were not used during the study. Participants then indicated their perceived neutrality towards their target animal, the animal's warmth and competence, and behavioural intentions towards the animal, and the animal's perceived similarity to humans and perceived shared emotional and cognitive traits with humans (all scales and items within scales presented in randomised order).

Participants were subsequently randomly assigned into one of the two similarity conditions (similar vs. dissimilar) and read the text within their condition. After reading their assigned text, participants were reminded of their target animal through again seeing the photograph of the animal, before again rating the animal's perceived similarity to humans and perceived shared emotional and cognitive traits with humans, the animal's warmth and competence, and behavioural intentions towards the animal (all scales and items within scales presented in randomised order), alongside completing an attention check within the perceived shared emotional and cognitive traits with humans scale. Specifically, to assess whether participants were paying sufficient attention to the measures and completing them correctly, participants were asked to '*Please select the answer '5'. This is to assess your attention'*. Four participants were excluded for failing this attention check (i.e., not providing the correct answer of five). Finally, participants indicated if their culture and/or religion typically views dogs as pets and pigs as food, before being debriefed and redirected back to Prolific. No participants reported technical difficulties. Participants received £1 via Prolific as reimbursement for full responses. Participants who provided partial data were reimbursed a proportion of the £1 based on their percentage of completion, whilst adhering to Prolific's minimum hourly rate.

6.5.3. Analyses

A 2(similarity: similar vs. dissimilar; between-subjects) x 2(species: dog vs. pig; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed MANCOVA was conducted on warmth, competence, active help, passive help, active harm, passive harm, perceived similarity to humans, perceived shared emotional traits with humans, and perceived shared cognitive traits with humans. Warmth, competence, active help, passive help, active harm, and passive harm were all conceptually related (i.e., from the SCM/BIAS map and subscales of the same overall scales), whilst perceived similarity to humans, perceived shared emotional traits with humans, and perceived shared cognitive traits with humans are conceptually related as they all measure similarity to humans albeit it in different ways. Additionally, perceived shared emotional traits with humans and perceived shared cognitive traits with humans are subscales of the same overall scale. Many of the DVs were statistically related through moderate correlations, *r*s ≥ .3, including between SCM/BIAS map DVs and similarity DVs. Thus, MANCOVA was deemed appropriate for this analysis.

Gender was again included as a covariate within the analyses. Again, although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analyses by controlling for and partialling out any relationship between gender and the outcome variables (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and warmth/competence perceptions of animals and behavioural intentions towards them (the outcome variables) to be statistically controlled for. Neutrality was also included within analyses as a covariate to account for bias in perceptions of animals. That is, by including neutrality as a covariate, the statistical model is then adjusted to account for this variable, thereby reducing variability and bias in the findings (Keen & Tiemeier, 2022), and increasing power of the analyses by statistically controlling for any possible relationship between neutrality and perceptions of/behavioural intentions towards animals (Tabachnick & Fidell, 2014).

Descriptive statistics for significant discussed main effects or for *post hoc* pairwise comparisons for significant interaction effects are reported in Tables 25-32.

6.5.3.1. Statistical Assumptions to Test H1-H4 and for Similarity Manipulation Checks: Exploring Effects of Manipulated Similarity on SCM/BIAS Map Variables and Measured Similarity (2x2x2 MANCOVA).

All DVs failed normality tests, *p*s < .05, in at least one condition, but competence, active help, passive help, perceived similarity to humans, perceived shared emotional traits with humans, and perceived shared cognitive traits with humans had acceptable skewness. Warmth had acceptable skewness in the pig conditions, but excessive skewness in the dog similar condition at pre-manipulation only and the dog dissimilar condition at post-manipulation only. Excessive skewness within those conditions arose in warmth due to one extreme univariate outlier in the dog similar condition at pre-manipulation, and one non-extreme univariate outlier in the dog dissimilar condition at post-manipulation. Removal of these two univariate outliers led to warmth having acceptable skewness across all conditions. Whilst comparing the MANCOVA including and excluding outliers was not possible (see below), running the MANCOVA including and excluding these two univariate outliers for warmth did not change multivariate conclusions. I therefore maintained warmth within the MANCOVA. Active harm and passive harm had excessive skewness, multiple univariate outliers, and floor effects in some of the dog conditions. Due to excessive skewness, multiple univariate outliers, and floor effects in active harm and passive harm, I also ran a MANCOVA excluding active harm and passive harm as DVs, which did not change multivariate conclusions. I therefore report the MANCOVA including active harm and passive harm as DVs.

Besides warmth, active harm, and passive harm, perceived similarity to humans had no univariate outliers, whilst all other DVs had non-extreme univariate outliers which did not cause excessive skewness. There were multivariate outliers for nine DVs, critical values ≥ 27.88, $p < .001$. Running the MANCOVA including and excluding univariate and multivariate outliers was not possible due to floor effects in active harm and passive harm. Running the MANCOVA including and excluding univariate and multivariate outliers without active harm and passive harm as DVs was also not possible, as exclusion of univariate and multivariate outliers led to homogenous scores in most DVs due to exclusion of most of the dataset. I therefore report the MANCOVA including univariate and multivariate outliers.

There was no multicollinearity, *r*s ≤ .8. Linear relationships between the DVs were mostly present across conditions. Running follow-up univariate ANCOVAs including and excluding univariate outliers for warmth, passive help, perceived shared emotional traits with humans, and perceived shared cognitive traits with humans did not change conclusions. Excluding univariate outliers changed one minor conclusion each for competence (Footnote 26) and active help (Footnote 27). I report these ANCOVAs including outliers to reflect the unamended dataset. Excessive skewness, multiple univariate outliers, and floor or ceiling effects in active harm and passive harm meant assumptions for the ANCOVAs on these two DVs were violated. However, I proceeded with these ANCOVAs due to robustness of ANCOVA to non-normality, and lack of non-parametric alternatives. Results from these ANCOVAs should be interpreted with caution.

Homogeneity of variances was present for pre-manipulation warmth, post-manipulation perceived shared emotional traits with humans, and for competence, passive help, perceived similarity to humans, and perceived shared cognitive traits with humans across timepoints, *p*s > .05. Homogeneity of variances was not present for post-manipulation warmth, pre-manipulation perceived shared emotional traits with humans, and for active help, active harm, and passive harm across timepoints, *p*s < .05. Homogeneity of covariances was not present, *p* < .001.

6.5.3.2. Testing H1-H4 and Similarity Manipulation Checks: Exploring Effects of Manipulated Similarity on SCM/BIAS Map Variables and Measured Similarity.

A 2(similarity: similar vs. dissimilar) x 2(species: dog vs. pig) x 2(time: pre- vs. post-manipulation) mixed MANCOVA, including gender and neutrality as covariates, was run on warmth, competence, active help, passive help, active harm, passive harm, perceived similarity to humans, perceived shared emotional traits with humans, and perceived shared cognitive traits with humans to: a) test effectiveness of the similarity text in manipulating measured similarity, and b) test **H1-H4**. Perceived similarity to humans, perceived shared emotional traits with humans, and perceived shared cognitive traits with humans were included in this MANCOVA instead of a separate 2(similarity: similar vs. dissimilar) x 2(time: pre- vs. post-manipulation) within-subjects MANCOVA to check consistent effectiveness of the similarity manipulation across species conditions (see Table A9 in Appendix 4 for full inferential statistics).

6.5.3.2.1. Multivariate Effects of Similarity and Species on Combined DVs.

There was a significant two-way interaction between time and similarity on the combined DVs, $F(9, 166) = 5.71, p < .001, \eta_p^2 = .24$ (large-sized). There were also significant main effects of similarity, $F(9, 166) = 2.84, p = .004, \eta_p^2 = .13$ (large-sized), and species, $F(9, 166) = 15.22, p < .001, \eta_p^2 = .45$ (large-sized), on the combined DVs. All other multivariate interactions and main effects were non-significant, *p*s > .05. I followed up significant multivariate effects with univariate ANCOVAs on the DVs below.

6.5.3.2.2. Manipulation Check: Univariate Effects of Manipulated Similarity and Species on Perceived Similarity to Humans.

To be deemed effective, the similarity manipulation would be expected to increase perceived similarity to humans from pre- to post-manipulation, and the similar condition should cause greater post-manipulation perceived similarity to humans than the dissimilar condition. Indeed, there was a significant interaction between time and similarity condition on perceived similarity to humans, $F(1, 174) = 17.33, p < .001, \eta_p^2 = .09$ (medium-sized). *Post hoc* pairwise comparisons revealed that, post-manipulation only, the similar condition significantly increased perceived similarity to humans more than the dissimilar condition, *p* =

.01, $d = .42$ (small-sized). As would be expected, this effect was not present pre-manipulation, $p = .83$. Additionally, the similar condition increased perceived similarity to humans from pre-manipulation to post-manipulation, $p < .001$, $d = .54$ (medium-sized). Conversely, in the dissimilar condition, perceived similarity to humans did not significantly differ from pre-manipulation to post-manipulation, $p = .85$. This interaction therefore suggests the similar text was effective in manipulating perceived similarity to humans from pre- to post-manipulation, and as compared to the dissimilar text. However, the dissimilar text was not effective in reducing perceived similarity to humans.

Table 25.
Descriptive Statistics for Interaction Effect of Similarity Condition and Time on Perceived Similarity to Humans.

Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Similar	39.36	2.75	49.87	2.81
Dissimilar	39.18	2.66	38.82	2.72

Beyond the manipulation check, there was a significant main effect of species on perceived similarity to humans, $F(1, 174) = 6.49$, $p = .01$, $\eta_p^2 = .04$ (small-sized), whereby dogs were deemed more similar to humans than pigs were. These findings suggest perceived similarity to humans was higher for dogs (vs. pigs) across similarity conditions and timepoints.

6.5.3.2.3. Manipulation Check: Univariate Effects of Manipulated Similarity and Species on Perceived Shared Emotional Traits with Humans.

To be deemed effective, the similarity manipulation would be expected to increase perceived shared emotional traits from pre- to post-manipulation, and to cause greater post-manipulation perceived shared emotional traits than the dissimilar condition. Indeed, there was a significant interaction between time and similarity condition on perceived shared emotional traits, $F(1, 174) = 29.75, p < .001, \eta_p^2 = .15$ (large-sized). *Post hoc* pairwise comparisons found that, post-manipulation only, participants in the similar condition perceived significantly higher shared emotional traits between the animal and humans compared to participants in the dissimilar condition, $p < .001, d = .76$ (medium-sized). As would be expected, this effect was not present pre-manipulation, $p = .18$. Additionally, participants in the similar condition perceived significantly higher shared emotional traits between the animal and humans post-manipulation compared to pre-manipulation, $p < .001, d = .46$ (small-sized). Unlike when similarity was measured via perceived similarity to humans, participants in the dissimilar condition perceived significantly fewer shared emotional traits between the animal and humans post-manipulation compared to pre-manipulation, $p < .001, d = .44$ (medium-sized). This interaction therefore evidences effectiveness of the similar text in manipulating perceived shared emotional traits with humans from pre- to post-manipulation, and as compared to the dissimilar text. It also suggests that, unlike when similarity is measured as perceived similarity to humans, the dissimilar condition decreases perceived shared emotional traits with humans from pre- to post-manipulation. Alongside this two-way interaction between time and similarity, there was a main effect of similarity on perceived shared emotional traits with humans, $F(1, 174) = 13.26, p < .001, \eta_p^2 = .07$ (medium-sized). However, this main effect is qualified by the above two-way interaction with time and is therefore not expanded upon further here.

Table 26.
Descriptive Statistics for Interaction Effect of Similarity Condition and Time on Perceived Shared Emotional Traits with Humans.

Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Similar	27.5	.6	29.59	.7
Dissimilar	26.36	.58	24.59	.68

Beyond the manipulation check, there was a significant main effect of species on perceived shared emotional traits with humans, $F(1, 174) = 45.36$, $p < .001$, $\eta_p^2 = .21$ (large-sized), whereby dogs were viewed as sharing significantly more emotional traits with humans than pigs were. These findings suggest perceived shared emotional traits with humans were higher for dogs (vs. pigs) across similarity conditions and timepoints.

6.5.3.2.4. Manipulation Check: Univariate Effects of Manipulated Similarity and Species on Perceived Shared Cognitive Traits with Humans.

To be deemed effective, the similarity manipulation would be expected to increase perceived shared cognitive traits with humans from pre- to post-manipulation, and to cause greater post-manipulation perceived shared cognitive traits with humans than the dissimilar condition. Indeed, there was a significant interaction between time and similarity condition on perceived shared cognitive traits with humans, $F(1, 174) = 40.27$, $p < .001$, $\eta_p^2 = .19$ (large-sized). *Post hoc* pairwise comparisons found that, post-manipulation only, participants in the similar condition perceived significantly more shared cognitive traits between the animal and humans compared to the dissimilar condition, $p = .002$, $d = .47$ (small-sized). As would be expected, this effect was not present pre-manipulation, $p = .22$. Additionally, participants in the similar condition perceived significantly more shared cognitive traits between the animal and humans post-manipulation compared to pre-manipulation, $p < .001$, $d = .54$ (medium-sized). Unlike when similarity was measured via perceived similarity to humans, participants in the dissimilar condition perceived significantly fewer shared cognitive traits between the animal and humans post-manipulation compared to pre-manipulation, $p = .001$, $d = .52$ (medium-sized). This interaction therefore evidences effectiveness of the similar text in manipulating perceived shared cognitive traits with humans from pre- to post-manipulation, and as compared to the dissimilar text. It also suggests that, unlike when similarity is measured as perceived similarity to humans, the dissimilar condition decreases perceived shared cognitive traits with humans from pre- to post-manipulation.

Table 27.
Descriptive Statistics for Interaction Effect of Similarity Condition and Time on Perceived Shared Cognitive Traits with Humans.

Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Similar	12.51	.44	14.49	.53
Dissimilar	13.27	.43	12.18	.51

Beyond the manipulation check, there was a significant main effect of species on perceived shared cognitive traits with humans, $F(1, 174) = 31.68, p < .001, \eta_p^2 = .15$ (large-sized), whereby dogs were viewed as sharing significantly more cognitive traits with humans than pigs were. These findings suggest perceived shared cognitive traits with humans were higher for dogs (vs. pigs) across similarity conditions and timepoints.

6.5.3.2.5. H1a and H3a: Univariate Effects of Similarity and Species on Warmth.

There was a significant two-way interaction between time and similarity on warmth, $F(1, 174) = 8.02, p = .01, \eta_p^2 = .04$ (small-sized). **Agreeing with H1a:** *Post hoc* pairwise comparisons revealed the similar condition caused significantly greater post-manipulation warmth than the dissimilar condition, $p < .001$, $d = .62$ (medium-sized). As would be expected, there was no significant difference in warmth between the two similarity conditions pre-manipulation, $p = .06$. Additionally, the similar condition significantly increased warmth from pre-manipulation to post-manipulation, $p = .02$, $d = .29$ (small-sized). Conversely, warmth did not significantly differ from pre-manipulation to post-manipulation in the dissimilar condition, $p = .12$. Due to the absence of an interaction with species, these findings extend **H1a** by demonstrating applicability of similarity to pigs' warmth as well as dogs.

Table 28.

Descriptive Statistics for Interaction Effect of Similarity Condition and Time on Warmth.

Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Similar	5.62	.3	6.33	.34
Dissimilar	4.82	.29	4.39	.33

Corroborating H3a: There was a significant main effect of species on warmth, $F(1, 174) = 72.84$, $p < .001$, $\eta_p^2 = .3$ (large-sized), whereby dogs were deemed warmer than pigs.

6.5.3.2.6. H1b and H3b: Univariate Effects of Similarity and Species on Competence.[26]

There was a significant two-way interaction between time and similarity on competence, $F(1, 174) = 23.41$, $p < .001$, $\eta_p^2 = .12$ (large-sized). **Agreeing with H1b:** *Post hoc* pairwise comparisons revealed the similar condition caused significantly greater post-manipulation competence than the dissimilar condition, $p < .001$, $d = .56$ (medium-sized). As would be expected, there was no significant difference in competence between the two similarity conditions pre-manipulation, $p = .9$. Additionally, the similar condition significantly increased competence from pre-manipulation to post-manipulation, $p = .003$, $d = .37$ (small-sized). Additionally, the dissimilar condition significantly decreased competence from pre-manipulation to post-manipulation, $p < .001$, $d = .5$ (medium-sized). Due to the absence of an interaction with species, these findings extend **H1b** by demonstrating applicability of similarity to pigs' competence as well as dogs. Alongside this two-way interaction between time and similarity, there was a main effect of similarity on competence, $F(1, 174) = 4.39$, $p = .04$, $\eta_p^2 = .03$ (small-sized). However, this main effect is qualified by the above two-way interaction with time and is therefore not expanded upon further here.

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[26] When excluding univariate outliers, the main effect of similarity on competence was no longer significant, $F(1, 172) = 3.45$, $p = .07$, $\eta_p^2 = .02$.

Table 29.
Descriptive Statistics for Interaction Effect of Similarity Condition and Time on Competence.

Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Similar	2.85	.38	3.86	.43
Dissimilar	2.92	.37	1.65	.41

Supporting H3b: There was a significant main effect of species on competence, $F(1, 174) = 90.12$, $p < .001$, $\eta_p^2 = .34$ (large-sized), in the predicted direction whereby dogs were deemed more competent than pigs.

6.5.3.2.7. H2a and H4a: Univariate Effects of Similarity and Species on Active Help.[27]

There was a significant two-way interaction between time and similarity on active help, $F(1, 174) = 4.98$, $p = .03$, $\eta_p^2 = .03$ (small-sized). *Post hoc* pairwise comparisons revealed that, post-manipulation only, the similar condition significantly increased active help compared to the dissimilar condition, $p < .001$, $d = .52$ (medium-sized). As expected, this effect was not present pre-manipulation, $p = .08$. **Agreeing with H2a:** The similar condition increased active help from pre-manipulation to post-manipulation, $p = .02$, $d = .3$ (small-sized). Conversely, the dissimilar condition did not cause significant differences in active help from pre-manipulation to post-manipulation, $p = .42$. Due to the absence of an interaction with species, these findings extend **H2a** by demonstrating applicability of similarity to active help towards pigs as well as dogs. Alongside this two-way interaction between time and similarity, there was a main effect of similarity on active help, $F(1, 174) =$

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[27] When excluding univariate outliers, the main effect of similarity on active help was no longer significant, $F(1, 163) = 2.38$, $p = .13$, $\eta_p^2 = .01$

7.64, $p = .01$, $\eta_p^2 = .04$ (small-sized). However, this main effect is qualified by the above two-way interaction with time and is therefore not expanded upon further here.

Table 30.
Descriptive Statistics for Interaction Effect of Similarity Condition and Time on Active Help.

Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Similar	7.33	.54	8.18	.51
Dissimilar	5.99	.52	5.71	.49

Corroborating H4a: There was a significant main effect of species on active help, $F(1, 174) = 55.63$, $p < .001$, $\eta_p^2 = .24$ (large-sized), whereby dogs were subject to greater active help than pigs.

6.5.3.2.8. H2b and H4b: Univariate Effects of Similarity and Species on Passive Help.

Not supporting H2b: There were no significant effects of similarity on passive help either as a main effect, $F(1, 174) = .25$, $p = .62$, $\eta_p^2 = .001$, or as a two-way interaction with time, $F(1, 174) = 3.03$, $p = .08$, $\eta_p^2 = .02$. **Agreeing with H4b:** There was a significant main effect of species on passive help, $F(1, 174) = 25.59$, $p < .001$, $\eta_p^2 = .13$ (large-sized), whereby dogs were subject to greater passive help than pigs .

6.5.3.2.9. H4c: Univariate Effects of Similarity and Species on Active Harm.

There was a significant two-way interaction between time and similarity on active harm, $F(1, 174) = 7.81$, $p = .01$, $\eta_p^2 = .04$ (small-sized). *Post hoc* pairwise comparisons revealed that, post-manipulation only, the similar condition significantly reduced active harm compared to the dissimilar condition, $p = .01$, $d = .39$ (small-sized). As would be expected, this effect was not present pre-manipulation, $p = .31$. Additionally, the similar condition decreased active harm from pre-manipulation to post-manipulation, $p = .01$, $d = .32$ (small-sized). Conversely, active harm did not significantly differ from pre-manipulation to post-manipulation in the dissimilar condition, $p = .18$.

Table 31.
Descriptive Statistics for Interaction Effect of Similarity Condition and Time on Active Harm.

Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Similar	-10.85	.46	-11.6	.49
Dissimilar	-10.19	.45	-9.81	.48

Agreeing with H4c: There was a significant main effect of species on active harm, $F(1, 174) = 77.33$, $p < .001$, $\eta_p^2 = .31$ (large-sized), whereby dogs were subject to less active harm than pigs.

6.5.3.2.10. H4d: Univariate Effects of Species and Similarity on Passive Harm.

There were no significant effects of similarity on passive harm either as a main effect, $F(1, 174) = 2.23$, $p = .14$, $\eta_p^2 = .01$, or as a two-way interaction with time, $F(1, 174) = .02$, $p = .88$, $\eta_p^2 < .001$. **Aligning with H4d:** There was a significant main effect of species on passive harm, $F(1, 174) = 47.21$, $p < .001$, $\eta_p^2 = .21$ (large-sized), in the predicted direction, whereby dogs were subject to less passive harm than pigs.

Table 32.
Descriptive Statistics for Effect of Species on Similarity Measures, Warmth, Competence, Active Help, Passive Help, Active Harm, and Passive Harm.

DV	Dog Mean	Dog *SE*	Pig Mean	Pig *SE*
Perceived Similarity to Humans**	46.18	2.57	36.94	2.52
Perceived Shared Emotional Traits***	29.86	.6	24.15	.59
Perceived Shared Cognitive Traits***	14.91	.45	11.31	.44
Warmth***	7	.29	3.58	.28
Competence***	5.27	.37	.37	.36
Active Help***	9.38	.49	4.22	.48
Passive Help***	3.7	.28	1.68	.28
Active Harm***	-13.42	.45	-7.81	.44
Passive Harm***	-4.65	.25	-2.27	.24

Note. ***p*≤.01, ****p*≤.001

6.5.3.3. Testing H5-H8: Exploring Mediational Relationships Between Similarity, Species and Behavioural Intentions Through Warmth/Competence.

Per the BIAS map, I predicted post-manipulation warmth would mediate the relationship between dogs' similarity and post-manipulation active help towards dogs (**H5**), whilst post-manipulation competence would mediate the relationship between dogs' similarity and post-manipulation passive help towards dogs (**H6**). I also hypothesised warmth would mediate relationships between species and active help (**a**) and active harm (**b; H7**) across timepoints, whilst competence would mediate relationships between species and passive help (**a**) and passive harm (**b; H8**).

To test **H5-H6**, I dummy coded similarity into one dummy variable with similarity coded as dissimilar (zero) and similar (one). To test **H7-H8**, I dummy coded species into one dummy variable with dog coded as zero and pig coded as one. Ten individual boot-strapped mediation analyses (10,000 bootstrap samples) were run using Model 4 in PROCESS through SPSS (Hayes, 2022) to assess mediational relationships for the behavioural intentions (**H5-H6** help intentions post-manipulation only; **H7-H8** across timepoints for all behavioural intentions). Whilst **H5-H6** were originally hypothesised to apply to dogs only, the above MANCOVA indicates these hypotheses also apply to pigs, due to effects of similarity on warmth, competence, active help, and active harm across species. Thus, I instead tested here if post-manipulation warmth mediates the relationship between similarity and post-manipulation active help (**H5**), and if post-manipulation competence mediates the relationship between similarity and post-manipulation passive help (**H6**), across species. To control for Type I error from multiple mediation testing, I utilised an adjusted confidence interval of 99%. Significant mediations are interpreted through confidence intervals which do not contain zero per Hayes (2018).

As warmth and competence were significantly correlated with each other at both timepoints within the current study as revealed through Pearson correlations, pre-manipulation $r = .6, p < .001$, post-manipulation $r = .7, p < .001$, and warmth and competence are conceptually related, warmth and competence were included as parallel mediators within the below mediation analyses. Inclusion of warmth and competence as parallel mediators allows for testing of any mediational roles of warmth for active behavioural intentions *whilst* controlling for competence, and any mediational roles of competence for passive behavioural intentions *whilst* controlling for warmth (Hayes, 2018).

6.5.3.3.1. H5: Mediation of Similarity on Post-Manipulation Active Help through Post-Manipulation Warmth.

Agreeing with H5: There was a significant indirect effect of similarity on post-manipulation active help through post-manipulation warmth when controlling for post-manipulation competence. Thus, post-manipulation warmth significantly mediated the relationship between similarity and post-manipulation active help across species (Figure 9). This model explained 43.2% of variance in active help ($R^2 = .432$). Additionally, inspection of path *b* indicated greater post-manipulation warmth significantly predicted greater post-manipulation active help (Figure 9).

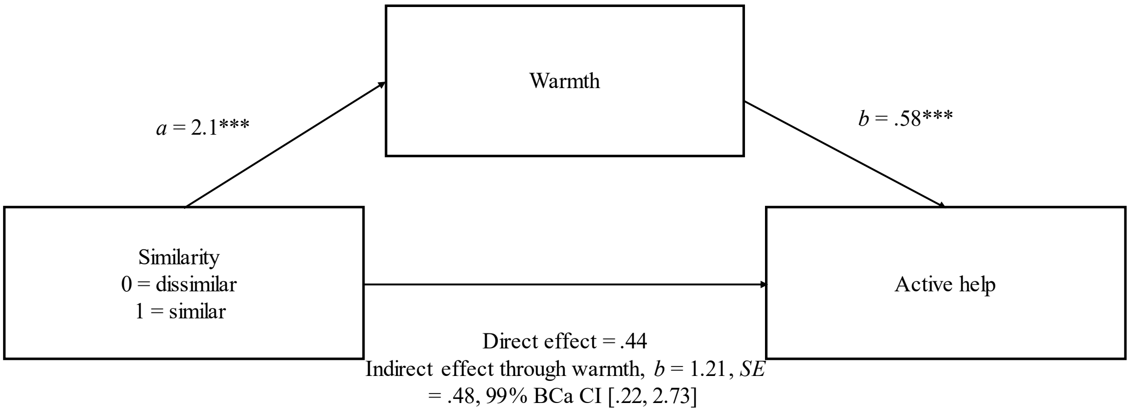

Figure 9. Mediational model of similarity on post-manipulation active help through post-manipulation warmth when controlling for post-manipulation competence. *Note:* Standard error is reported for indirect effect only. ***$p<.001$

6.5.3.3.2. H6: Mediation of Similarity on Post-Manipulation Passive Help through Post-Manipulation Competence.

Supporting H6: There was a significant indirect effect of similarity on post-manipulation passive help via post-manipulation competence when controlling for post-manipulation warmth. Thus, post-manipulation competence significantly mediated the relationship between similarity and post-manipulation passive help across species (Figure 10). This model explained 26.8% of variance in passive help ($R^2 = .268$). Additionally, inspection of path *b* indicated greater post-manipulation competence significantly predicted greater post-manipulation passive help (Figure 10).

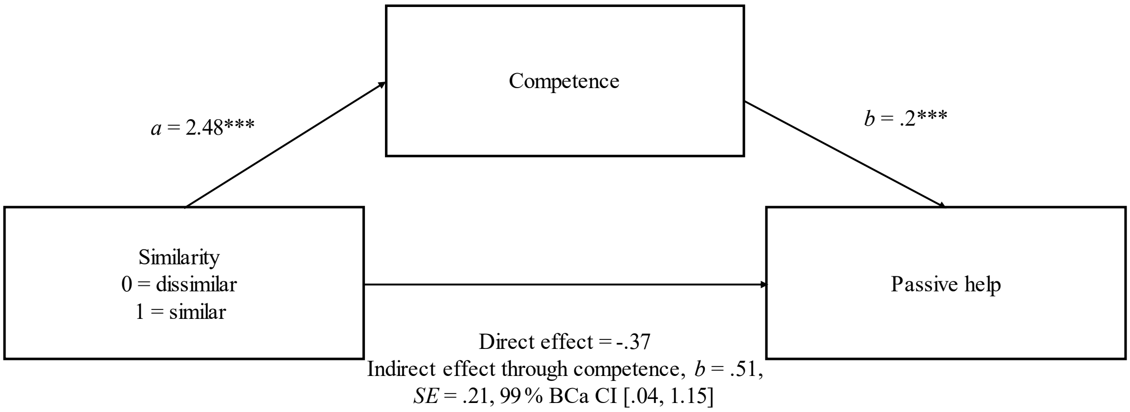

Figure 10. Mediational model of similarity on post-manipulation passive help through post-manipulation competence when controlling for post-manipulation warmth. *Note:* Standard error is reported for indirect effect only. ***$p<.001$

6.5.3.3.3. H7a: Mediation of Species on Active Help through Warmth.

Aligning with H7a: There was a significant indirect effect of species on active help through warmth pre-manipulation and post-manipulation when controlling for competence. Thus, warmth significantly mediated the relationship between species and active help across timepoints (Figure 11). The model explained 42.6% ($R^2 = .426$) and 45.5% ($R^2 = .455$) of variance in active help for pre- and post-manipulation respectively. Additionally, inspection of path *b* indicated greater warmth significantly predicted greater active help (Figure 11).

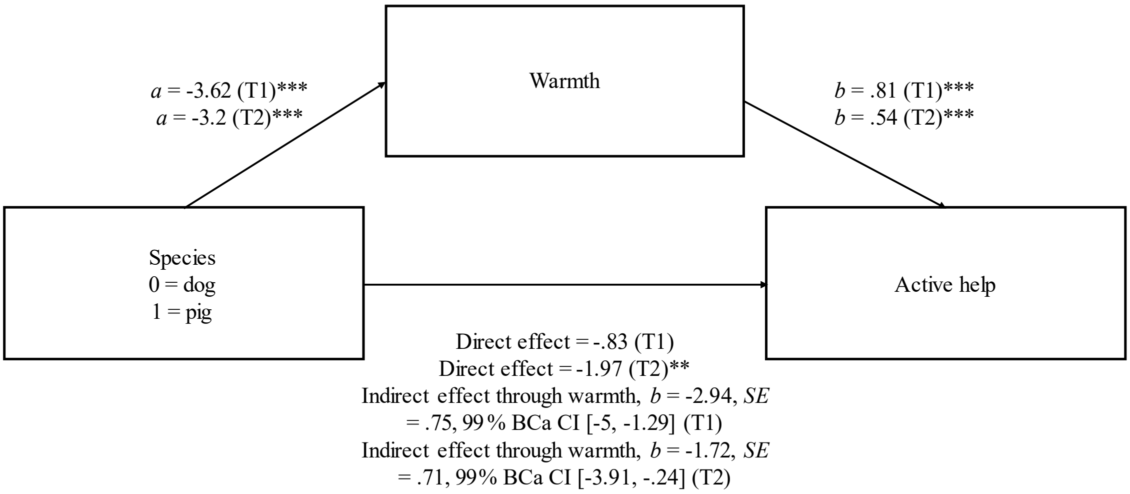

Figure 11. Pre- and post-manipulation mediational models of species on active help through warmth when controlling for competence. *Note:* T1 refers to pre-manipulation and T2 refers to post-manipulation. Standard error is reported for indirect effects only. $^{**}p \leq .01$ $^{***}p < .001$

6.5.3.3.4. H7b: Mediation of Species on Active Harm through Warmth.

Supporting H7b: There was a significant indirect effect of species on active harm through warmth pre-manipulation and post-manipulation when controlling for competence. Thus, warmth significantly mediated the relationship between species and active harm across timepoints (Figure 12). The model explained 49.2% ($R^2 = .492$) and 47% ($R^2 = .47$) of variance in active harm for pre- and post-manipulation respectively. Additionally, inspection of path *b* indicated greater warmth significantly predicted less active harm (Figure 12).

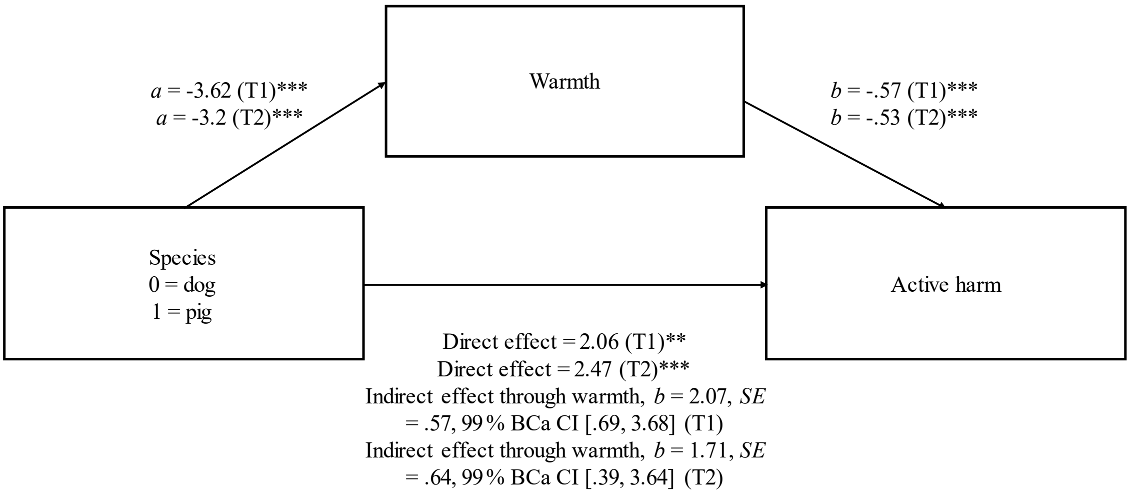

Figure 12. Pre- and post-manipulation mediational models of species on active harm through warmth when controlling for competence. *Note:* T1 refers to pre-manipulation and T2 refers to post-manipulation. Standard error is reported for indirect effects only. ***p*≤.01, ****p*<.001

6.5.3.3.5. H8a: Mediation of Species on Passive Help through Competence.

Not supporting H8a: There was no significant indirect effect of species on passive help through competence when controlling for warmth, either pre-manipulation, *b* = -.65, *SE* = .34, 99% CI [-1.56, .22], or post-manipulation, *b* = -.81, *SE* = .33, 99% CI [-1.62, .13]. Thus, competence did not significantly mediate the relationship between species and passive help at either timepoint. However, inspection of path *b* indicated greater competence did significantly predict greater passive help both pre-manipulation, *b* = .13, *SE* = .06, *p* = .045, 99% CI [-.04, .29], and post-manipulation, *b* = .17, *SE* = .06, *p* = .003, 99% CI [.02, .32].

6.5.3.3.6. H8b: Mediation of Species on Passive Harm through Competence.

Not supporting H8b: There was no significant indirect effect of species on passive harm through competence when controlling for warmth, either pre-manipulation, *b* = .76, *SE* = .35, 99% CI [-.2, 1.66], or post-manipulation, *b* = .56, *SE* = .23, 99% CI [-.03, 1.23]. Thus, competence did not significantly mediate the relationship between species and passive harm at either timepoint. However, inspection of path *b* indicated greater competence did significantly predict lower passive harm, both pre-manipulation, $b = -.15$, $SE = .05$, $p = .004$, 99% CI [-.29, -.02], and post-manipulation, $b = -.12$, $SE = .05$, $p = .02$, 99% CI [-.25, .01].

6.5.4. Discussion

6.5.4.1. Discussion of Findings.

6.5.4.1.1. H1-H2: Effects of Similarity on SCM/BIAS Map Variables.

As expected, and agreeing with previous literature (Batt, 2009; Kozachenko & Piazza, 2021; Westbury & Neumann, 2008) and Study 4, the similar condition was superior to the dissimilar condition in causing increased post-manipulation warmth and post-manipulation competence across species (medium-sized; **H1a-H1b**), and similarity increased warmth and competence of, and active help towards, dogs and pigs from pre- to post-manipulation (small-sized; **H1a-H2a**). Pre- to post-manipulation effects are small-sized only, so may have lower practical significance. Although Studies 4-5 found no effect of the dissimilar condition on active help from pre- to post-manipulation, the similar condition within this study was unlike Study 4 in being superior to the dissimilar condition in causing increased post-manipulation active help across species (medium-sized). These findings not only support **H1a-H2a**, but also extend original hypotheses from dogs only to pigs. That is, despite positive similarity information (e.g., intelligence) about pigs sometimes being disregarded when people form their perceptions of pigs (Piazza & Loughnan, 2016), the current study does not find any disregarding of similarity information about pigs in warmth, competence, or active help. This lack of disregarding similarity information aligns with more recent research (Leach et al., 2021).

There were no significant effects of similarity on passive help (not supporting **H2b**) or on passive harm. That is, unlike Study 4, similarity did not increase passive help from preto post-manipulation, and, like Study 4, the similar condition did not cause greater post-manipulation passive help compared to the dissimilar condition. Additionally, like Study 4, there were no effects of similarity on passive harm either from pre- to post-manipulation, or at post-manipulation only when contrasting with the dissimilar condition. However, findings for passive help and passive harm should be interpreted with caution due to inadequate scale reliability for both variables, and due to floor effects, excessive skewness, and outliers within passive harm.

Presuming the pre- to post-manipulation effect of similarity on passive help found within Study 4 is robust (e.g., if it can be replicated with an adequately reliable passive help scale), then there is a discrepancy in findings across Studies 4-5, as the current study did not find any pre- to post-manipulation effect of similarity on passive help. Such a discrepancy may arise from a combination of the target animal being unknown in Study 4 and the nature of the passive help items ('*sustain*', '*conserve*'). Specifically, the passive help items address support for conservation behaviours, and support for conservation is informed by an animal's endangered status (Tisdell et al., 2007). Thus, describing the unknown animal in Study 4 as similar to humans, combined with a lack of awareness from participants on how endangered the animal is or is not, may have increased participants' willingness to passively help (sustain, conserve) the animal from pre- to post-manipulation. Conversely, as participants are aware dogs and pigs are not endangered (and so do not need conserving), similarity information may have not informed passive help towards them.

Also deviating from Study 4, there were significant effects of similarity on active harm within the study (although these findings should be interpreted with caution due to significant floor effects, excessive skewness, and outliers in active harm). Specifically, the current study found that the similar condition was superior to the dissimilar condition in decreasing post-manipulation active harm, whilst similarity also decreased active harm from pre- to post-manipulation (small-sized). These effects are small-sized only, so may have lower practical significance. However, supporting the BIAS map, these effects on active harm agree with the effects of similarity on warmth, as warmth predicts lower active harm. Thus, similarity positively impacts dogs' and pigs' warmth as expected, and negatively impacts active harm towards dogs and pigs, in alignment with the BIAS map. However, combined with Study 4 findings, this effect of similarity on active harm indicates similarity only decreases active harm towards known animals (i.e., dog and pigs; Study 5), and not unknown animals (i.e., tree kangaroos; Study 4).

6.5.4.1.2. Effects of Dissimilarity on SCM/BIAS Map Variables.

Warmth, active help, and passive help did not significantly differ from pre- to post-manipulation in the dissimilar condition. Whilst these findings are consistent with Study 4 regarding help intentions, these findings also indicate the negative effect of dissimilarity on warmth for unknown animals from Study 4 may not be evidenced with dogs or pigs. Unlike warmth, dissimilarity information did decrease dogs' and pigs' competence from pre- to post-manipulation within this study (medium-sized), aligning with Study 4. That is, participants found both dogs and pigs less competent after being informed these animals are dissimilar to humans. Thus, dissimilarity informs known and unknown animals' competence across studies.

Considering Study 4 and the current study results together, dogs' and pigs' (but not unknown animals') warmth is stable and not easily decreased by dissimilarity information, whilst dogs', pigs', and unknown animals' competence is decreased by dissimilarity information. Conversely, pigs', dogs', and unknown animals' warmth and competence are increased by similarity information. These findings therefore uniquely indicate that a) warmth and competence of unknown animals are informed by (dis)similarity information (perhaps due to lack of prior information and hence full reliance on [dis]similarity information), b) perceptions of dogs' and pigs' competence decrease following dissimilarity information and increase following similarity information, and c) perceptions of dogs' and pigs' warmth are robust to change following dissimilarity information, but do improve following similarity information. That is, whilst dogs' and pigs' warmth can increase, dogs' and pigs' warmth may already be informed by participants' robust preconceptions of these animals, and thus these animals' warmth does not decrease following dissimilarity information.

Regarding harm intentions, there was no effect of dissimilarity information on active or passive harm from pre- to post-manipulation. These findings are in line with Study 4 null effects of dissimilarity on harm intentions.

6.5.4.1.3. H3-H4: Effect of Species on SCM/BIAS Map Variables (Pet Speciesism).

Aligning with **H3-H4,** previous literature (Caviola & Capraro, 2019; Gradidge et al., 2021b) and Studies 1 and 3, pet speciesism was evidenced across all DVs. That is, dogs were deemed significantly warmer and more competent, and subject to significantly more active and passive help, and less active and passive harm, than pigs (large-sized). Thus, the current study replicates previous evidence of pet speciesism and, alongside Studies 1 and 3, extends findings to the SCM/BIAS map specifically.

6.5.4.1.4. H5-H8: Exploring Mediational Relationships Between Similarity, Species and Behavioural Intentions Through Warmth/Competence

Mediation analyses supported **H5-H7**, but not **H8,** therefore providing some support for previous SCM/BIAS map literature as applied to animals (Sevillano & Fiske, 2016b). Specifically, warmth mediated relationships between similarity and post-manipulation active help, species and active help, and species and active harm. That is, aligning with Study 4, the similar (vs. dissimilar) condition caused greater post-manipulation warmth, which in turn predicted greater post-manipulation active help. Additionally, dogs were deemed warmer than pigs, which in turn informed greater active help and less active harm towards them. Conversely, post-manipulation competence mediated the relationship between similarity and post-manipulation passive help. Therefore, agreeing with Study 4, the similar (vs. dissimilar) condition caused greater post-manipulation competence, which in turn predicted greater post-manipulation passive help. However, competence did not mediate the relationships between species and passive help, and species and passive harm, which does not support the BIAS map (Sevillano & Fiske, 2016b).

Inspection of path *b*s revealed that greater warmth was consistently associated with greater active help across the similarity and species mediation analyses, whilst greater warmth was consistently linked to lower active harm across the species mediation analyses. Greater competence was also consistently associated with greater passive help across the similarity and species mediation analyses, whilst greater competence was consistently linked to lower passive harm across the species mediation analyses, despite null mediational relationships between species and passive behavioural intentions through competence. The mediation analyses here therefore fully support the BIAS map applied to animals in regard to warmth, whilst only partially supporting the BIAS map applied to animals in regards to competence.

6.5.4.2. Limitations of the Current Study and Directions for Future Research.

The current study has some limitations to be addressed in future research: a) imprecision in the similarity manipulation, and b) lack of consideration of mediators.

Firstly, the text developed and used within this study and Study 4 stated species are similar or dissimilar to humans on four different attributes: behaviour, sociality, intelligence, and emotionality. It is therefore unclear a) whether effects of the similarity manipulation on DVs are arising from the animal simply being described as ‘similar’ or ‘dissimilar’ to humans, or from one or more of the four attributes specifically, and b), if arising from the specific attributes, exactly which attribute/s are contributing to effects of similarity. For example, differing mental characteristics of animals inform separate aspects of mind attribution and differentially affect moral judgements (e.g., moral acceptability of consuming the animal; Leach et al., 2021). Thus, the four attributes may feasibly have differing effects on perceptions of, and behavioural intentions towards, animals. Future research should test whether effects of similarity are arising from ‘similar’ vs. ‘dissimilar’ labelling or from specific attributes/s, by manipulating whether a target animal is presented as ‘similar’ or ‘dissimilar’ to humans across the four attributes individually and without mention of any attributes.

Secondly, the study is limited in explaining exactly how similarity causes pet speciesism and would benefit from further research exploring possible mediators of the effects of similarity on perceptions of animals. One such possible set of mediators is emotions. That is, the SCM/BIAS map operate through emotions like pity, contempt, pride, and envy with perceptions of human groups (Fiske et al., 2002; Cuddy et al., 2007; Fiske, 2018), whereby combinations of warmth and competence inform emotions, which in turn inform behavioural intentions. However, emotions towards animals sometimes differ from emotions felt towards humans (Sevillano & Fiske, 2016b). For instance, ‘threatening-awe’ animals (high in competence, low in warmth) are typically viewed with awe instead of, as would be expected for perceptions of humans, envy. Meanwhile, ‘prey’ animals (moderate in warmth, low in competence) are viewed with indifference instead of, as would be expected for perceptions of humans, pity (Sevillano & Fiske, 2016b). Future research should therefore explicitly measure the animal-applicable emotions (fondness, awe, indifference, and contempt; Sevillano & Fiske, 2016b), and test if they mediate the relationships between (dis)similarity and perceptions of, and behavioural intentions towards, animals found here.

This research would a) further elucidate the process of how and why similarity causes pet speciesism, b) enable stronger similarity interventions to be developed which could reduce pet speciesism (e.g., by developing similarity interventions which elicit stronger positive emotions and thereby more positive behavioural intentions; also see Neves et al., 2022), and c) contribute to emerging literature on emotions towards animals in the context of the SCM/BIAS map. For example, similarity of an animal to humans may enhance active help towards the animal not only due to increased warmth, but also through the emotion of fondness, whereby greater fondness mediates the relationship between greater warmth (following similarity information) and greater active help.

6.5.4.3. Conclusion.

Using the SCM/BIAS map, the current study determined causal effects of similarity on perceptions of, and behavioural intentions towards, dogs and pigs for the first time, evidencing that similarity information contributes to positive perceptions of animals' warmth and competence, alongside increasing active help and decreasing active harm towards animals. Further, the current study found that dissimilarity decreases animals' competence, and again demonstrates that dogs are deemed more similar to humans than pigs are.

This study has limitations regarding imprecision in the similarity manipulation, and lack of consideration of emotions as mediators. Future research should therefore determine exactly which components of the similarity manipulation cause similarity's positive effects, and measure and test mediational roles of emotions in the relationships between perceptions of animals and behavioural intentions.

Overall, the similarity studies (Studies 4-5) indicate (dis)similarity informs the pet speciesism gaps in warmth, competence, active help, and active harm. Specifically, similarity causes pet speciesism in these domains in two main ways. Firstly, dogs' (vs. pigs') increased similarity informs dogs' greater warmth and competence, alongside informing greater active help and lower active harm towards dogs as compared to pigs. Secondly, pigs' (vs. dogs') lower similarity informs pigs' lower warmth and competence, alongside informing lower active help and greater active harm towards pigs compared to dogs. Conversely, dissimilarity contributes to pet speciesism through decreasing competence, whereby pigs' greater perceived dissimilarity to humans informs pigs' (vs. dogs') lower competence. Unlike all other SCM/BIAS map dimensions, similarity may be unable to explain pet speciesism gaps in passive help and passive harm, due to null effects with known animals in this study.

To conclude, the current similarity studies are the first to causally test the role of similarity to humans in perceptions of and behavioural intentions towards animals, and the findings expand and add complexity to previous literature. Similarity consistently causes pet speciesism in warmth, competence, and active help, whereby dogs' greater perceived similarity to humans contributes to their greater warmth and competence and greater active help towards them, whilst pigs' lower perceived similarity to humans contributes to their lower warmth and competence and lower active help towards them.

6.6. Overall Discussion

Through three pilot studies, an alternative familiarity manipulation based on the mere exposure effect failed to effectively manipulate familiarity. As such, familiarity was not explored any further and it can therefore not be ascertained if familiarity is a cause of pet speciesism. However, *similarity* was applied to pet speciesism specifically within Study 5 as the similarity manipulation used within Study 4 had been effective in manipulating similarity. Overall, Study 5 found that similarity is a cause of pet speciesism in the dimensions of warmth, competence, and active help.

Chapter 7. Pilot Study and Study 6 Exploring Pet Status

7.1. Introduction

The current chapter first presents a pilot study (Pilot Study 1c) to develop and pilot a pet status manipulation, before then implementing this manipulation within Study 6 in this chapter, to test if pet status is a cause of pet speciesism. These studies are now reported in turn below.

7.2. Pilot Study 1c to Test Pet Status Manipulation

7.2.1. Introduction

As Study 1 found correlational relationships between pet status and dogs' and pigs' warmth and competence, I aimed to test if these relationships are causal, and therefore if pet status can explain pet speciesism. However, before testing for this causal role, I first needed to develop and pilot a pet status manipulation which effectively manipulates pet status. As such, the current pilot study (Pilot Study 1c) therefore aims to test if a pet status manipulation developed by the current researcher is effective at manipulating its intended variable. Pet status is manipulated through text describing a target animal as either being '*typically kept as a pet animal*' (pet status condition) or '*typically not kept as a pet animal*' (lack of pet status condition), taking a similar approach to previous categorisation manipulations which have utilised simple labels like '*edible*'/'*not edible*' or '*food*'/'*not food*' (e.g., Bastian et al., 2012a; Bilewicz et al., 2016; Bratanova et al., 2011). As with Studies 2-4, an unknown animal (either tree kangaroo, fossa, or tamandua) is utilised as the target animal, as an adapted version of the novel animal paradigm to assess unmoderated effects of familiarity. To check effectiveness of the pet status manipulation (manipulation check), the item '*How much do you perceive the species in the photograph to be a 'pet' animal (an animal that is kept within a household as a companion)?*' is included to measure pet status. Utilising a similar approach to previous categorisation manipulations (Bastian et al., 2012a; Bilewicz et al., 2016; Bratanova et al., 2011), I hypothesise that:

H1: Stating that the animal is typically kept as a pet animal (vs. not) in a text manipulation will significantly increase the animal's pet status.

Note that this pilot study utilises the same participant sample to also follow-up/pilot text manipulations for behavioural self-relevance, subjective self-relevance, familiarity, and similarity, but only information relevant to the pet status manipulation is reported within the current chapter (see Section 4.2. for pilot study information about the behavioural and subjective self-relevance manipulations [Pilot Study 1a], and Section 5.2. for pilot study information about the familiarity and similarity manipulations [Pilot Study 1b]).

7.2.2. Methods

7.2.2.1. Participants.

Sixty-eight participants were recruited via social media and Sona as a volunteer sample. Thirteen participants were excluded for providing partial data. As all participants stated they were either a man or woman, no participants had to be excluded to enable gender to be dummy coded for inclusion of gender as a covariate (see Section 7.2.3. for further discussion). Exclusions left a total sample size of 55 participants (81.8% women, 18.2% men; M_{age}=23.38, SD_{age}=5.68, age range: 18-48), which exceeds the recommend 12 participants per condition for pilot studies (Julious, 2005). Participants within each condition are shown in Table 33. Demographics of the sample are reported as follows in percentages, with demographic categories which make up less than 2% of the sample being collapsed into 'other'. For dietary group: 69.1% (meat consumer), 12.7% (reducetarian), 7.3% (vegetarian), and 5.5% each (flexitarian, pescatarian). For nationality: 54.5% (British), 5.5% (Romanian), 3.6% each (German, Indian, Lithuanian, no response, Portuguese, Spanish), and 18.4% other.

For ethnicity: 76.1% (White), 12.6% (Asian), 3.6% each (mixed, would rather not say), and 4.1% other. For country of residence (M_{duration}=17.91, SD_{duration}=10.12, range: 1-48 years): 81.8% (United Kingdom), 3.6% (Germany), and 14.6% other. For religion: 29.1% (atheism), 21.8% (Christianity), 18.2% (agnosticism), 14.5% (would rather not say), 5.5% (no response), 3.6% each (Buddhism, Islam), and 3.7% other.

Table 33.
Participants Within Each Condition for Pilot Study 1c.

Pet Status Condition	Number of Participants
Pet	29
Non-Pet	26

7.2.2.2. Design.

The current pilot study follows a one-way (pet status: pet vs. non-pet) between-subjects ANCOVA design, with measured pet status as the DV. Pet status was included as a DV to test effectiveness of the manipulation. Gender was included as a covariate (see Section 7.2.3. for further discussion).

7.2.2.3. Materials.

7.2.2.3.1. Pet Status Manipulation.

Pet status was manipulated via texts developed by the researcher, whereby participants read that '*tree kangaroos/fossas/tamanduas* [dependent on target animal] *are typically [pet status condition] / not typically [lack of pet status condition] kept as a pet animal.*"

7.2.2.3.2. Measured Pet Status.

Perceived pet status was measured via the same single item from Study 1, except *'How much do you perceive the following animals to be a 'pet' animal (an animal that is kept within a household as a companion)?'* was reworded to '*How much do you perceive tree* *kangaroos/fossas/tamanduas to be a 'pet' animal (an animal that is kept within a household as a companion)?'*. Additionally, this item was re-scaled from a one to five Likert scale used in Study 1 to a zero to 100 visual analogue scale here to ensure parametric data. A higher score on measured pet status indicates greater perceived pet status.

7.2.2.3.3. Attention and Memory Checks.

Attention paid to and memory for the text manipulations was tested through five attention and memory check items developed by the researcher as follows: '*What animal did the text that you just read refer to?*', '*What type of animal did the text that you just read mention?*', *'Did the text that you just read state that tree kangaroos/fossas/tamanduas are or are not typically considered to be pet animals?*', '*Did the text that you just read mention a specific culture?*', and '*Did the text that you just read mention pest animals?*'. These checks aimed to test that participants paid attention to and remembered the texts. Correct answers for each item received a score of one, whilst incorrect answers for each item received a score of zero. All answers were then added together, for a highest possible score of five. Inspection of these checks revealed that the vast majority of the sample (>75%) had perfect scores, indicating sufficient attention and memory for these manipulations.

7.2.2.3.4. Believability of the Pet Status Manipulation (Beltramini, 1982; Beltramini & Evans, 1985; Chang, 2011).

Perceived believability of the pet status text manipulation was measured in order to ensure the text was not simply disregarded. Believability was measured through a six-item semantic differential believability measure (Beltramini, 1982; Beltramini & Evans, 1985; α=.94 from Chang, 2011), whereby participants answer how much they perceive the text to be '*unbelievable vs. believable*', '*untrustworthy vs. trustworthy*', '*not credible vs. credible*', '*unreasonable vs. reasonable*', '*not convincing vs. convincing*', and '*biased vs. unbiased*'. Reliability was adequate for this scale within this study, ω=.89. Therefore, items were summed together to create a total believability score. Higher scores indicate greater believability. No items are reverse-scored. The majority of the sample (>50%) perceived the pet status manipulation to be believable.

7.2.2.4. Procedure.

Participants were recruited via social media and Sona. The experiment was conducted in September and October 2020 as a voluntary, open survey. After providing informed consent, participants were asked if they recognised tree kangaroos (alongside a photograph of the animal), followed by a fossa and tamandua if participants recognised any previous animal. Animal species names were used throughout the study. The study either proceeded using the unrecognised animal as the target animal, or, if participants recognised all three animals, they were redirected towards the end of the study and did not participate further.

Following initial recognition stage, participants completed the three sections (self-relevance, familiarity/similarity, and pet status) of the pilot study in a randomised order. Here, only the pet status section is described (see Section 4.2. for description of the self-relevance section, and Section 5.2. for description of the familiarity and similarity section). For the pet status section, participants were randomly assigned to read one of the two pet status text manipulations described in Section 7.2.2.3.1. regarding their target animal. After reading their pet status text, participants answered the five attention and memory checks, completed the measures for pet status (manipulation check), and then indicated their perceived believability of the text. Finally, participants provided demographics before being debriefed. One participant reported technical difficulties, but their response was complete and maintained within analyses.

7.2.3. Analyses

A one-way (pet status: pet vs. non-pet) between-subjects ANCOVA, including gender as a covariate, was conducted on measured pet status, to test if the manipulation effectively manipulates pet status. Gender was again included as a covariate within this ANCOVA. Although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analysis by controlling for and partialling out any relationship between gender and the outcome variable (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and measured pet status (the outcome variable) to be statistically controlled for.

7.2.3.1. Statistical Assumptions to Test H1: Exploring Effects of Pet Status Manipulation on Measured Pet Status (One-Way ANCOVA).

Measured pet status failed normality in the lack of pet status condition, $p < .05$, whilst the normality assumption was met as assessed through a normality test in the pet status condition, $p > .05$. Skewness was acceptable in the pet status condition, but was extreme in the lack of pet status condition. Additionally, measured pet status had some extreme univariate outliers in the lack of pet status condition, and no univariate outliers in the pet status condition. Running the ANCOVA including and excluding the univariate outliers made skewness acceptable in the lack of pet status condition and did not change univariate conclusions. I report this ANCOVA including outliers to reflect the unamended dataset. Homogeneity of variances was not present, $p = .01$.

7.2.3.2. Testing H1: Exploring Effects of Pet Status Manipulations on Measured Pet Status.

A one-way (pet status: pet vs. non-pet) between-subjects ANCOVA, including gender as a covariate, was run on measured pet status to test **H1. Supporting H1:** There was a significant main effect of manipulated pet status on measured pet status, $F(1, 52) = 13.73$, $p < .001$, $\eta_p^2 = .21$ (large-sized). That is, the pet status condition resulted in participants viewing the animal as having greater pet status (M=42.31, SD=34.51) compared to participants in the no pet status condition (M=10.23, SD=21.17).

7.2.4. Discussion and Conclusion

As expected, the pet status condition led to greater perceived pet status than the lack of pet status condition, thereby supporting **H1.** Therefore, the current study demonstrates that the pet status manipulation developed by the researcher is effective at manipulating pet status. Informed by these findings, the pet status manipulation is utilised within Study 6 to test causal effects of pet status on pet speciesism. As the pet status manipulation was found to be effective in manipulating pet status within the current pilot study, this manipulation is mostly unchanged within Study 6. However, the manipulation has been slightly amended to attempt to enhance effectiveness of the manipulation. Specifically, in order to enhance legitimacy of the texts and appeal to authority (Walton, 2010), the phrases '*imagine reading the following sentence in the newspaper*' and '*according to experts*' are included at the beginning of the text within Study 6. Additionally, participants are asked to imagine they read this text in the newspaper as a way to make the texts seem more realistic (e.g., akin to Leach et al., 2021).

7.3. Study 6: Causal Exploration of Pet Status

7.3.1. Introduction and Extension from Study 1

Study 1 found that pet status (how much an animal is deemed to be a companion animal) had a significant positive relationship with dogs' and pigs' warmth and competence.

These findings agree with previous literature which has found that people view pet animals more positively than non-pet animals (Signal et al., 2018; Taylor & Signal, 2009), whereby the simple labelling of an animal as a 'pet' engenders positive perceptions of the animal. These findings are underpinned by 'categorisation' theory, whereby the mere categorisation of an animal as a 'pet' informs how people perceive the animal (Bratanova et al., 2011).

The current study aims to extend Study 1 findings by exploring if pet status causes animals' warmth and competence, through causally manipulating the pet status of an unknown animal, whereby pet status is manipulated by text piloted in Pilot Study 1c (Section 7.2.) which describes a target animal as either being '*typically kept as a pet animal*' (pet status condition) or '*typically not kept as a pet animal*' (lack of pet status condition). As with Studies 2-4, the target animal is an unknown animal, which is again utilised as an adapted version of the novel animal paradigm to assess unmoderated effects of pet status. Warmth and competence are again measured within the current study using the SCM subscales from Sevillano and Fiske (2016b). In line with Study 1 findings whereby greater pet status was associated with greater warmth and competence, and in line with previous literature evidencing the positive effects of pet status (Signal et al., 2018; Taylor & Signal, 2009), I therefore hypothesise that:

> **H1**: Animals portrayed as pet animals (vs. not) will be deemed significantly warmer (**a**) and more competent (**b**).

Like Studies 2-4, the current study also extends possible effects of pet status from warmth and competence to behavioural intentions. Specifically, warmth should inform greater active help and less active harm, whilst competence should inform greater passive help and less passive harm (Cuddy et al., 2007). Thus, per the BIAS map, relationships between pet status and warmth and competence from Study 1 should extend to causal effects on active and passive behavioural intentions within this study, whereby behavioural intentions are again measured within the current study using the BIAS map subscales from Sevillano and Fiske (2016b). As such, I predict that:

> **H2**: If animals portrayed as pet animals (vs. not) are deemed significantly warmer (i.e., **H1a** is evidenced), 'pet' (vs. non-'pet') animals will be subject to significantly less active harm (**a**) and more active help (**b**). If animals portrayed as pet animals (vs. not) are deemed significantly more competent (i.e., **H1b** is evidenced), 'pet' (vs. non-'pet') animals will be subject to significantly less passive harm (**c**) and more passive help (**d**).

Finally, inclusion of measurements for behavioural intentions within this study again enables BIAS map applicability to animals to be tested (Sevillano & Fiske, 2016b, 2019). That is, this study can determine directly if any effects of pet status on active and passive behavioural intentions are mediated through warmth and competence respectively, in line with both general SCM and BIAS map literature (Cuddy et al., 2007) and SCM/BIAS map literature applied to animals specifically (Sevillano & Fiske, 2016b, 2019). Therefore, I hypothesise that:

> **H3**: Post-manipulation warmth will significantly mediate relationships between pet status and active harm and active help. That is, animals portrayed as pet animals (vs. not) will be deemed significantly warmer post-manipulation, significantly increasing post-manipulation active help (**a**) and decreasing post-manipulation active harm (**b**).
>
> **H4**: Post-manipulation competence will significantly mediate relationships between pet status and passive harm and passive help. That is, animals portrayed as pet animals (vs. not) will be deemed significantly more competent post-manipulation,

significantly increasing post-manipulation passive help (**a**) and decreasing post-manipulation passive harm (**b**).

7.3.2. Methods

7.3.2.1. Participants.

One-hundred-and-ninety-six participants were recruited via volunteer sampling either via social media and Sona, or via Prolific. Qualtrics quota sampling was implemented to ensure approximately 50% men and 50% women, alongside representative numbers of people of different dietary identities in the sample in proportion to the population: approximately 86% meat consumers, 6% vegetarians, 5% pescatarians, and 3% vegans in the United Kingdom population (Johnson, 2022). As with Study 4, people with a flexitarian diet did not have a specific quota but were still included within the sample. For participants recruited via Prolific, quota sampling was partially used through Prolific's 'balance by sex' option to obtain approximately equal numbers of men and women. Sixty-eight participants were excluded for: exceeding quotas (n=41), providing partial data (n=23), withdrawing their data (n=1), or recognising all animals (n=1). As all analyses included gender as a covariate (see Section 7.3.3. for further discussion), two non-binary participants were excluded to enable gender to be dummy coded into women (coded as zero; n=64) and men (coded as one; n=64). Exclusions left a sample of 128 participants (50% women, 50% men; M_{age}=24.46, SD_{age}=6.01, age range=18-54), which met the minimum required sample size of 128 per a G*Power *a priori* power analysis for a MANOVA analysis ('repeated measures, within-between interaction', medium effect size f=.25, two groups, two measurements, α=.05, power = .8).

One-hundred-and-twenty participants completed the study about tree kangaroos, whilst eight participants recognised the tree kangaroo and completed the study about fossas (n=7) or tamanduas (if they recognised the fossa; n=1). Participants within each condition are shown in Table 34. Demographics of the sample are reported as follows in percentages, with demographic categories which make up less than 2% of the sample being collapsed into 'other'. The percentage of participants for each diet approximately matches sizes within the general population. For dietary group: 85.9% (meat consumer), 6.3% (vegetarian), 4.7% (pescatarian), 2.3% (vegan), and .8% other. For nationality: 32.9% (United Kingdom/British), 7.8% (Polish), 5.5% (Canadian), 3.9% (Malaysian), 3.1% each (Italian, Mexican, Nigerian, Portuguese, South African, United States), 2.3% each (Chinese, German, Greek, Latvian), and 22.1% other. For ethnicity: 61.1% (White), 14.8% (Asian), 9.4% (mixed), 7.9% (Black), 3.1% each (Arab, Hispanic/Latino), and .6% other. For country of residence (M_{duration}=18.5, SD_{duration}=9.6, range: one to 48 years): 46.5% (United Kingdom), 6.3% (United States), 5.5% each (Canada, Poland), 4.7% (Malaysia), 3.1% each (Portugal, South Africa), 2.3% each (Australia, Germany, Mexico, the Netherlands), and 15.8% other. For religion: 37.6% (Christianity), 26.6% (atheism), 10.2% (agnosticism), 8.6% (would rather not say), 4.7% each (Buddhism, Islam), 3.1% (no response), 2.3% (no religion), and 2.2% other.

Table 34.
Participants Within Each Condition for Study 6.

Pet Status Condition	Number of Participants
Present	66
Absent	62

7.3.2.2. Design.

This experiment follows a 2(pet status: pet vs. non-pet; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed MANCOVA design, with warmth, competence, active help, passive help, active harm, and passive harm as the DVs. Pet status was included as a DV in a separate ANCOVA to test effectiveness of the manipulation. Gender and neutrality were included as covariates (see Section 7.3.3. for further discussion).

7.3.2.3. Materials.

7.3.2.3.1. Target Animals and Animal Photographs.

The current study again employed the novel animal paradigm by implementing the same photographs of the animals (tree kangaroo, fossa, tamandua) from Studies 2 and 4, whereby the tree kangaroo photograph was sourced from https://www.shutterstock.com/image-photo/close-shot-cute-tree-kangaroo-168261035, the fossa photograph sourced from https://www.flickr.com/photos/mathiasappel/19504925051, and the tamandua photograph sourced from https://tinyurl.com/2jazjz3s. These photographs enable easier visualisation of the imagined scenario and reduce biased perceptions of the animal due to species name.

7.3.2.3.2. Pet Status Text Manipulations.

Pet status was manipulated via texts developed and successfully piloted by the researcher (Pilot Study 1c; Section 7.2.). Specifically, participants were asked to '*Imagine reading the following sentence in the newspaper*', and then read: "*According to experts, the species in the photograph is typically [pet status condition] / not typically [lack of pet status condition] kept as a pet animal.*" This pet status manipulation was amended slightly from Pilot Study 1c, in order to enhance legitimacy of the texts and appeal to authority (Walton, 2010) by including the phrases '*imagine reading the following sentence in the newspaper*' and '*according to experts*' at the beginning of the text within the current study. Additionally, participants were asked to imagine they read this text in the newspaper as a way to make the texts seem more realistic. For instance, previous research has successfully manipulated perceptions of animals by presenting information in a scientific article format (Leach et al., 2021). Participants read the text for at least one minute to ensure sufficient attention.

7.3.2.3.3. Warmth and Competence (Sevillano & Fiske, 2016b).

Warmth and competence were measured with the same items from Studies 1-5: '*warm*', '*well-intentioned*', '*friendly*' (warmth), and '*competent*', '*skillful*', '*intelligent*' (competence; Sevillano & Fiske, 2016b). Like Studies 3-5, these items were measured using a semantic differential from -3 to 3, with higher scores indicating greater warmth or competence. Items within each subscale were summed to provide warmth and competence scores. Reliability was adequate within this study for warmth (pre-manipulation ω=.76, 95% BCa CI [.67, .82]; post-manipulation ω=.86, 95% BCa CI [.8, .91) and competence (pre-manipulation: ω=.81, 95% BCa CI [.71, .87]; post-manipulation: ω=.89, 95% BCa CI [.84, .93]) across timepoints.

7.3.2.3.4. Behavioural Intentions Towards the Animal (Sevillano & Fiske, 2016b).

Behavioural intentions were measured with the same items from Studies 2-4: '*support*', '*help*', '*behave friendly towards*', '*interact with*' the animal (active help), '*sustain*', '*conserve*' the animal (passive help), '*kill*', '*injure*', '*exterminate*', '*trap*', '*reject*' the animal (active harm), and '*let the species die off', '*ignore*' the animal (passive harm; Sevillano & Fiske, 2016b). Like Studies 3-5, these items were measured using a semantic differential from -3 to 3, with higher scores indicating greater active help, active harm, passive help, or passive harm. Items within each subscale were summed to provide active help, passive help, active harm, and passive harm scores. Reliability was adequate within this study for passive help (pre-manipulation r_{sb}=.74; post-manipulation r_{sb}=.81) and active harm (pre-manipulation ω=.79, 95% BCa CI [.64, .88]; post-manipulation ω=.86, 95% BCa CI [.76, .91]) across timepoints. Whilst reliability was adequate for active help post-manipulation (ω=.76, 95% BCa CI [.66, .84]), reliability was inadequate for active help pre-manipulation (ω=.67, 95% BCa CI [.54, .76]), and for passive harm across timepoints (pre-manipulation: r_{sb}=.57; post-manipulation: r_{sb}=.48). As the passive harm subscale contains two items, I did not run a PAFA for this subscale. Due to inadequate reliability of the active help subscale at pre-manipulation, I ran a PAFA (Appendix 2h) on this subscale at pre-manipulation only with direct oblimin rotation to test factorial validity, alongside assessing inter-item correlations to test reliability and communality values to test common variance. The PAFA revealed adequate loading of all items onto the active help subscale (≥ .5), supporting factorial validity, alongside adequate communality for the first item (.41), and adequate (though not ideal) communalities for all other items (≥.25; Child, 2006). Except for an inadequate inter-item correlation between item three and item four, *r*=.29, all other inter-item correlations to assess reliability were adequate, .31 ≤ *r*s ≤ .43. I therefore decided to retain the third and fourth items due to their adequate inter-item correlations with all other times, and due to adequate reliability of the active help subscale post-manipulation. Due to inadequate reliability of the passive harm and active help subscales at one or both timepoints, findings from these subscales should be interpreted with caution.

7.3.2.3.5. Perceived Neutrality Towards the Animal.

Neutrality was measured via the same single item utilised in Studies 3-5, with a higher score indicating higher neutrality and less bias: '*How neutral do you perceive the species in the previous photograph to be?*' from zero to 100.

7.3.2.3.6. Perceived Pet Status (Manipulation Check).

Perceived pet status was measured via the same single item from Study 1, except *'How much do you perceive the following animals to be a 'pet' animal (an animal that is kept within a household as a companion)?'* was reworded to '*How much do you perceive the species in the photograph to be a 'pet' animal (an animal that is kept within a household as a companion)?'* to avoid participant bias from hearing the species name. Additionally, this item was re-scaled from a one to five Likert scale used in Study 1 to a zero to 100 visual analogue scale here to ensure parametric data. A higher score on measured pet status indicates greater perceived pet status.

7.3.2.4. Procedure.

Participants were recruited via avenues like social media and Sona (*n*=95), or via Prolific (*n*=33; Appendix 10). All participants were required to not have taken part in previous studies within this thesis. The experiment was conducted in March 2021 and November 2021 as a voluntary, open survey. After providing informed consent, participants gave demographic information, with participants exceeding diet and/or gender quotas being automatically excluded from participating further by Qualtrics. Remaining eligible participants were presented with a photograph of a tree kangaroo and asked if they recognised the animal, followed by a fossa and then tamandua if participants recognised any previous animal. Animal species names were not used during the study. The experiment either proceeded using the unrecognised animal as the target animal, or, if participants recognised all three animals, they were redirected towards the end of the experiment and did not participate further. One participant recognised all animals and was therefore excluded from the study. After initial recognition, participants indicated their perceived neutrality towards their target animal, the animal's warmth and competence, and behavioural intentions towards the animal (all scales and items within scales presented in randomised order).

Participants were subsequently randomly assigned into one of the two pet status conditions (pet status vs. lack of pet status) and read the text within their condition as described in Section 7.3.2.3.2. After reading their assigned text, participants rated the animal's perceived pet status, followed by again rating the animal's warmth and competence and behavioural intentions towards the animal (all scales and items within scales presented in randomised order), before being debriefed. Eight participants reported technical difficulties, but responses were complete and maintained within analyses. ARU undergraduate psychology students (*n*=2) received 0.25 Sona credits as reimbursement. All other participants not recruited via Prolific could enter a prize draw to win of two £50 Amazon gift vouchers if they wished. For participants recruited via Prolific, participants received £1 via Prolific as reimbursement for full responses. Participants who provided partial data or who recognised all animals were reimbursed a proportion of the £1 based either on their percentage of completion (partial data) or time spent completing the survey (recognition), whilst adhering to Prolific's minimum hourly rate.

7.3.3. Analyses

A 2(pet status: pet vs. non-pet; between-subjects) x 2(time: pre- vs. post-manipulation; within-subjects) mixed MANCOVA was conducted on warmth, competence, active help, passive help, active harm, and passive harm. As all of the DVs were conceptually related (i.e., from the SCM/BIAS map and subscales of the same overall scales), alongside many DVs being statistically related through moderate correlations, *r*s ≥ .3, MANCOVA was deemed appropriate for this analysis. Additionally, a one-way (pet status: pet vs. non-pet) between-subjects ANCOVA was run on measured pet status.

Gender was again included as a covariate within the analyses. Again, although the current study randomly allocates participants to conditions, and therefore gender is approximately evenly balanced across conditions, inclusion of this covariate still increases power of the analyses by controlling for and partialling out any relationship between gender and the outcome variables (Tabachnick & Fidell, 2014). Therefore, as gender has previously been found to impact perceptions of animals (e.g., Apostol et al., 2013; Herzog, 2007), including gender as a covariate allows for any theoretically-informed relationships between gender and warmth/competence perceptions of animals and behavioural intentions towards them (the outcome variables) to be statistically controlled for. Neutrality was also included within analyses as a covariate to account for bias in perceptions of animals. That is, by including neutrality as a covariate, the statistical model is then adjusted to account for this variable, thereby reducing variability and bias in the findings (Keen & Tiemeier, 2022), and increasing power of the analyses by statistically controlling for any possible relationship between neutrality and perceptions of/behavioural intentions towards animals (Tabachnick & Fidell, 2014).

Descriptive statistics for significant discussed main effects or for *post hoc* pairwise comparisons for significant interaction effects are reported in Tables 35-37.

Finally, one-tailed one-sample *t*-tests were conducted on warmth, competence, and behavioural intentions (like Studies 3-4).

7.3.3.1. Statistical Assumptions to Test H1-H2: Exploring Effects of Pet Status on SCM/BIAS Map Variables (2x2 MANCOVA).

The DVs frequently failed normality tests, *p*s < .05, but all DVs, except active harm, had acceptable skewness. Due to excessive skewness, multiple extreme univariate outliers, and floor effects in active harm, I also ran a MANCOVA excluding active harm as a DV, which changed one minor multivariate conclusion (Footnote 28). I therefore report the MANCOVA including active harm as a DV.

All DVs except active harm had univariate outliers which did not cause excessive skewness. There were multivariate outliers for six DVs, critical values ≥ 22.46, $p < .001$. Running the MANCOVA including and excluding univariate and multivariate outliers was not possible due to floor effects in active harm. Running the MANCOVA including and excluding univariate and multivariate outliers without active harm as a DV indicated multivariate conclusions did change (Footnote 29). However, I report the MANCOVA including univariate and multivariate outliers to reflect the unamended dataset, and also because the dataset excluding univariate and multivariate outliers was underpowered (*n*=100). There was no multicollinearity, *r*s ≤ .71. Linear relationships between the DVs were mostly present across all conditions.

Running analyses including and excluding outliers did not change conclusions for competence and active help. Excluding outliers changed one minor conclusion for warmth (Footnote 30) and passive help (Footnote 32), and one main conclusion for passive harm (Footnote 31). I report all analyses including outliers to reflect the unaltered dataset. Excessive skewness, multiple univariate outliers, and floor effects in active harm meant assumptions for the ANCOVA on this DV were violated. However, I proceeded with this ANCOVA due to robustness of ANCOVA to non-normality, and lack of non-parametric alternatives. Results from this ANCOVA should be interpreted with caution.

Homogeneity of variances was present for all DVs across timepoints, *p*s > .05, except for passive help at pre-manipulation, *p* < .05. Homogeneity of covariances was present, *p* = .01.

7.3.3.2. Statistical Assumptions for Pet Status Manipulation Check: Exploring Effect of Manipulated Pet Status on Measured Pet Status (One-Way ANCOVA).

Measured pet status failed normality tests, *p*s < .05, but skewness was acceptable. There was one outlier in measured pet status in the lack of pet status condition. Running the analysis including and excluding this outlier did not change conclusions. Homogeneity of variances was present, > .05.

7.3.3.3. Manipulation Check: Exploring Effect of Manipulated Pet Status on Measured Pet Status.

A one-way between-subjects ANCOVA, including gender and neutrality as covariates, was conducted on pet status to test effectiveness of the pet status text in manipulating measured pet status. An ANCOVA was conducted for this manipulation check instead of an independent-samples *t*-test to enable inclusion of gender and neutrality as covariates (see Table A10 in Appendix 4 for full inferential statistics). There was a significant effect of the pet status manipulation on measured pet status, $F(1, 123) = 5.06$, $p = .03$, $\eta_p^2 = .04$ (small-sized), in the expected direction. Specifically, participants in the pet status condition reported greater perceived pet status of the animal (*M*=34.21, *SD*=29.55) compared to participants in the no pet status condition (*M*=21.36, *SD*=23.62). Thus, the pet status text was effective at manipulating pet status. Beyond the manipulation check, there was a significant main effect of neutrality on measured pet status, $F(1, 123) = 6.28$, $p = .01$, $\eta_p^2 = .05$ (small-to-medium-sized), whereby greater neutrality was linked to greater perceived pet status, $B = .27$, $SE = .11$.

7.3.3.4. Testing H1-H2: Exploring Effects of Pet Status on SCM/BIAS Map Variables.

A 2(pet status: pet vs. non-pet) x 2(time: pre- vs. post-manipulation) mixed MANCOVA, including gender and neutrality as covariates, was run on warmth, competence, active harm, active help, passive harm, and passive help to test **H1-H2** (see Table A11 in Appendix 4 for full inferential statistics).

7.3.3.4.1. Multivariate Effects of Pet Status on Combined DVs.[28, 29]

There was a significant interaction effect between time and condition on the combined DVs, $F(6, 119) = 2.46$, $p = .03$, $\eta_p^2 = .11$ (medium-sized). There was also a significant main

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[28] When excluding active harm from the MANCOVA, an interaction between time and neutrality on the combined DVs became significant, $F(5, 120) = 2.31$, $p = .048$, $\eta p2 = .09$ (medium-sized), whereby neutrality had a significant multivariate effect on the combined DVs pre-manipulation, $B = .04$, $SE = .01$, $p = .004$, but not post-manipulation, $B = .03$, $SE = .02$, $p = .07$.

[29] When excluding univariate and multivariate outliers, the interaction effect between time and condition on the combined DVs became non-significant, $F(5, 92) = 2.23$, $p = .06$, $\eta_p^2 = .11$. Additionally, an interaction effect between time and neutrality on the combined DVs became significant, $F(5, 92) = 3.02$, $p = .01$, $\eta_p^2 = .14$ (large-sized), and a main effect of time on the combined DVs also became significant, $F(5, 92) = 2.86$, $p = .02$, $\eta_p^2 = .13$ (medium-to-large-sized). However, the sample size excluding all univariate and multivariate outliers was highly underpowered (*n*=100), so these results should be interpreted with caution.

effect of neutrality on the combined DVs, *F*(6, 119) = 2.6, $p = .02$, $\eta_p^2 = .12$ (medium-to-large-sized). All other multivariate interactions and main effects were non-significant, *p*s > .05. I followed up significant multivariate effects with univariate ANCOVAs on the DVs below.

7.3.3.4.2. H1a: Univariate Effects of Pet Status on Warmth.[30]

There was a significant interaction between time and pet status on warmth, *F*(1, 124) = 10.03, $p = .002$, $\eta_p^2 = .08$ (medium-sized). **Agreeing with H1a:** *Post hoc* pairwise comparisons revealed that, post-manipulation only, the presence of pet status increased warmth compared to when pet status was absent, $p = .03$, $d = .4$ (small-sized). As would be expected, pet status conditions did not significantly differ at pre-manipulation, $p = .54$. Additionally, the presence of pet status significantly increased warmth from pre-manipulation to post-manipulation, $p = .01$, $d = .34$ (small-sized), whereas, when pet status was absent, warmth did not significantly differ from pre-manipulation to post-manipulation, $p = .09$. There was also a significant main effect of neutrality on warmth, *F*(1, 124) = 7.09, $p = .01$, $\eta_p^2 = .05$ (small-to-medium-sized), whereby greater neutrality was linked to greater warmth pre-manipulation, $B = .04$, $SE = .01$, $p = .004$, but not post-manipulation, $B = .03$, $SE = .02$, $p = .07$.

Table 35.
Descriptive Statistics for Interaction Effect of Pet Status Condition and Time on Warmth.

Pet Status Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Present	3.09	.45	4.28	.48
Absent	3.49	.46	2.73	.5

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[30] When excluding univariate outliers, the significant main effect of neutrality on warmth remained significant, *F*(1, 121) = 12.52, $p < .001$, $\eta_p^2 = .09$ (medium-sized). As when including outliers, greater neutrality was linked to greater warmth pre-manipulation, $B = .05$, $SE = .01$, $p = .0002$, but this effect also became significant post-manipulation, $B = .04$, $SE = .02$, $p = .02$.

7.3.3.4.3. H1b: Univariate Effects of Pet Status on Competence.

Not supporting H1b: There was not a significant interaction between time and pet status on competence, $F(1, 124) = 1$, $p = .32$, $\eta_p^2 = .01$. There was, however, a significant main effect of neutrality on competence, $F(1, 124) = 5.07$, $p = .03$, $\eta_p^2 = .04$ (small-sized), whereby greater neutrality was linked to greater competence post-manipulation, $B = .04$, $SE = .01$, $p = .01$, but not pre-manipulation, $B = .02$, $SE = .01$, $p = .11$.

7.3.3.4.4. H2a: Univariate Effects of Pet Status on Active Harm.

There was a significant interaction between time and pet status on active harm, $F(1, 124) = 4.89$, $p = .03$, $\eta_p^2 = .04$ (small-sized). **Partially consistent with H2a:** *Post hoc* pairwise comparisons found that the presence of pet status significantly decreased active harm from pre-manipulation to post-manipulation, $p = .04$, $d = .25$ (small-sized). When pet status was absent, active harm did not significantly differ from pre-manipulation to post-manipulation, $p = .28$. **Not supporting H2a:** *Post hoc* pairwise comparisons revealed the pet status conditions did not significantly differ post-manipulation in active harm, $p = .14$. As would be expected, the pet status conditions did not significantly differ pre-manipulation in active harm, $p = .69$.

Table 36.
Descriptive Statistics for Interaction Effect of Pet Status Condition and Time on Active Harm.

Pet Status Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Present	-11.41	.61	-12.47	.59
Absent	-11.76	.63	-11.2	.61

7.3.3.4.5. H2b: Univariate Effects of Pet Status on Active Help.

Not supporting H2b: There was not a significant interaction between time and pet status on active help, $F(1, 124) = 2.69$, $p = .1$, $\eta_p^2 = .02$.

7.3.3.4.6. H2c: Univariate Effects of Pet Status on Passive Harm.[31]

There was a significant interaction between time and pet status on passive harm, $F(1, 124) = 4.43$, $p = .04$, $\eta_p^2 = .03$ (small-sized). **Agreeing with H2c:** *Post hoc* pairwise comparisons found that, post-manipulation only, the presence of pet status significantly decreased passive harm compared to when pet status was absent, $p = .03$, $d = .4$ (small-sized). As would be expected, there was no significant difference in passive harm between the pet status conditions pre-manipulation, $p = .88$. Additionally, the presence of pet status significantly decreased passive harm from pre-manipulation to post-manipulation, $p = .03$, $d = .28$ (small-sized). When pet status was absent, passive harm did not significantly differ from pre-manipulation to post-manipulation, $p = .41$.

Table 37.
Descriptive Statistics for Interaction Effect of Pet Status Condition and Time on Passive Harm.

Pet Status Condition	Pre-Manipulation Mean	Pre-Manipulation *SE*	Post-Manipulation Mean	Post-Manipulation *SE*
Present	-3.41	.34	-4.06	.3
Absent	-3.34	.35	-3.08	.31

7.3.3.4.6. H2d: Univariate Effects of Pet Status on Passive Help.[32]

Not supporting H2d, there was no significant interaction between time and pet status on passive help, $F(1, 124) = 1.39$, $p = .24$, $\eta_p^2 = .01$. There was, however, a significant main effect of neutrality on passive help, $F(1, 124) = 7.08$, $p = .01$, $\eta_p^2 = .05$ (small-to-medium-

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[31] When excluding univariate outliers, the significant interaction between time and pet status on passive harm remained significant, $F(1, 121) = 7.24$, $p = .01$, $\eta_p^2 = .06$ (medium-sized), and most *post hoc* pairwise comparisons did not change. However, the presence of pet status no longer significantly reduced post-manipulation passive harm compared to when pet status was absent, $p = .06$.

[32] When excluding univariate outliers, the significant main effect of neutrality on passive help remained significant, $F(1, 122) = 4.8$, $p = .03$, $\eta_p^2 = .04$. However, greater neutrality was now linked to greater passive help only at pre-manipulation, $B = .03$, $SE = .01$, $p = 01$, and was no longer significant post-manipulation, $B = .02$, $SE = .01$, $p = .13$.

sized), whereby greater neutrality was linked to greater passive help pre-manipulation, *B* = .04, *SE* = .01, *p* = .004, and post-manipulation, *B* = .03, *SE* = .01, *p* = .048.

7.3.3.5. Testing if Warmth/Competence Perceptions and Behavioural Intentions Towards the Animal Differ from Zero.

Twelve one-tailed one-sample *t*-tests were conducted on warmth, competence, active help, active harm, passive help, and passive harm at pre- and post-manipulation to test if perceptions of and behavioural intentions towards animals significantly differ from zero. These *t*-tests revealed all perceptions and behavioural intentions significantly differed from zero, *p*s < .001, whereby the unknown animal was deemed significantly warmer and more competent than zero across timepoints. Additionally, participants were significantly more willing to actively and passively help, and less willing to actively and passively harm, the animal compared to zero. Like Studies 3-4, these findings indicate a positivity bias towards the unknown animal.

7.3.3.6. Testing H3-H4: Exploring Mediational Relationships Between Pet Status and Behavioural Intentions Through Warmth/Competence

Per the BIAS map, I predicted warmth would mediate the relationship between pet status and post-manipulation active help (**a**) and post-manipulation active harm (**b; H3**). I also hypothesised competence would mediate the relationship between pet status and post-manipulation passive help (**a**) and post-manipulation passive harm (**b; H4**).

To test **H3-H4**, I dummy coded pet status into one dummy variable with lack of pet status coded as zero and pet status coded as one. Four individual boot-strapped mediation analyses (10,000 bootstrap samples) were run using Model 4 in PROCESS through SPSS (Hayes, 2022) to assess mediational relationships for the four behavioural intentions. To control for Type I error from multiple mediation testing, I utilised an adjusted confidence interval of 99%. Significant mediations are interpreted through confidence intervals which do not contain zero per Hayes (2018).

As post-manipulation warmth and post-manipulation competence were significantly correlated with each other within the current study as revealed through a Pearson correlation, $r = .58$, $p < .001$, and warmth and competence are conceptually related, warmth and competence were included as parallel mediators within the below mediation analyses. Inclusion of warmth and competence as parallel mediators allows for testing of any mediational roles of warmth for active behavioural intentions *whilst* controlling for competence, and any mediational roles of competence for passive behavioural intentions *whilst* controlling for warmth (Hayes, 2018).

7.3.3.6.1. H3a: Mediation of Pet Status on Active Help through Warmth.

Not supporting H3a: There was no significant indirect effect of pet status on post-manipulation active help via post-manipulation warmth when controlling for post-manipulation competence, $b = .99$, $SE = .45$, 99% CI [-.007, 2.37]. Thus, post-manipulation warmth did not significantly mediate the relationship between pet status and post-manipulation active help. Despite lack of mediation, inspection of path *b* indicated greater post-manipulation warmth significantly predicted greater post-manipulation active help, $b = .54$, $SE = .12$, $p < .001$, 99% CI [.22, .87].

7.3.3.6.2. H3b: Mediation of Pet Status on Active Harm through Warmth.

Supporting H3b: There was a significant indirect effect of pet status on post-manipulation active harm via post-manipulation warmth when controlling for post-manipulation competence (Figure 13). Thus, post-manipulation warmth significantly mediated the relationship between pet status and post-manipulation active harm. This model explained 15.5% of variance in active harm ($R^2 = .155$). Additionally, inspection of path *b* indicated greater warmth significantly predicted less active harm (Figure 13).

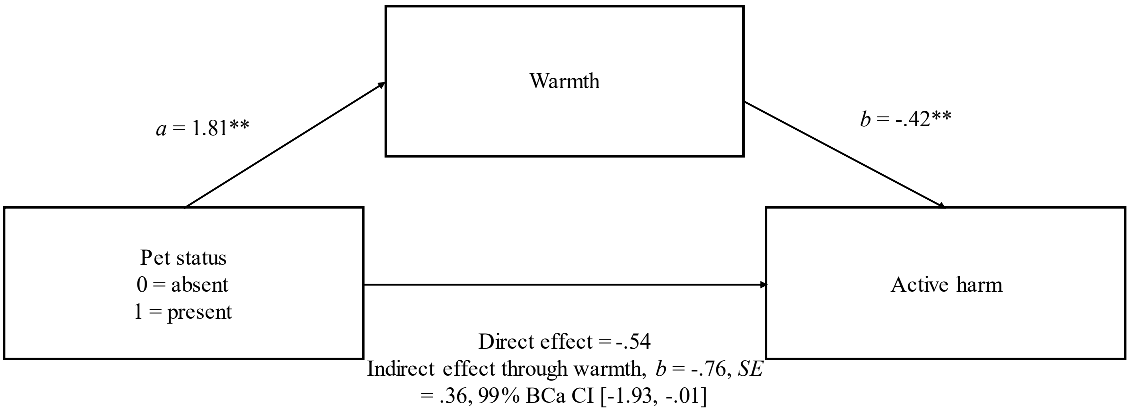

Figure 13. Mediational model of pet status on post-manipulation active harm through post-manipulation warmth when controlling for post-manipulation competence. *Note:* Standard error is reported for indirect effect only. **$p \leq .01$

7.3.3.6.3. H4a: Mediation of Pet Status on Passive Help through Competence.

Not supporting H4a: There was no significant indirect effect of pet status on post-manipulation passive help via post-manipulation competence when controlling for post-manipulation warmth, *b* = .03, *SE* = .19, 99% CI [-.45, .6]. Therefore, post-manipulation competence did not significantly mediate the relationship between pet status and post-manipulation passive help. Despite lack of mediation, inspection of path *b* indicated greater competence significantly predicted greater passive help, *b* = .29, *SE* = .09, *p* = .002, 99% CI [.05, .54].

7.3.3.6.4. H4b: Mediation of Pet Status on Passive Harm through Competence.

Not supporting H4b: There was no significant indirect effect of pet status on post-manipulation passive harm via post-manipulation competence when controlling for post-manipulation warmth, *b* = -.002, *SE* = .04, 99% CI [-.13, .16]. Therefore, post-manipulation competence did not significantly mediate the relationship between pet status and post-manipulation passive harm. Additionally, inspection of path *b* indicated competence did not significantly predict passive harm, *b* = -.01, *SE* = .07, *p* = .86, 99% CI [-.2, .17].

7.3.4. Discussion

7.3.4.1. Discussion of Findings.

7.3.4.1.1. H1-H2: Effects of Pet Status on SCM/BIAS Map Variables.

As predicted, and agreeing with previous literature (Signal et al., 2018), animals described as pets were deemed warmer (**H1a**), from pre- to post-manipulation, and as compared to animals described as not being pets (small-sized). Additionally, a lack of pet status did not impact warmth from pre- to post-manipulation, indicating pet status confers a benefit in improving animals' warmth, whilst the absence of pet status may not confer a disadvantage. However, the pet status effect on warmth is small-sized only, so may have lower practical significance.

Conversely, not supporting **H1b** and previous literature indicating positive effects of pet status (Signal et al., 2018), pet status did not significantly affect competence. Previous literature on the role of pet status is limited and has only investigated non-causal relationships between pet status, generalised attitudes towards animals (e.g., the Animal Attitude Scale; Herzog et al., 1991), and empathy (Hazel et al., 2011; Signal et al., 2018), without yet investigating competence or related variables. Thus, pet status may simply not inform perceptions of animals' competence specifically, and the lack of effect of pet status on competence may thereby represent a unique finding of the current study. Hypothetically, pet status may impact warmth and not competence as pet status may be linked to the assumption that pets are domesticated, and therefore friendly by nature (e.g., domestication can be linked to pro-sociality; Hare et al., 2002). This friendliness (good intent) would reflect in higher warmth. Conversely, assumed domestication may not necessarily be linked to an increased ability for an animal to act on intentions, and may therefore not impact upon competence.

Not supporting **H2b** and **H2d**, there were no effects of pet status on active and passive help (although findings for active help should be interpreted with caution due to inadequate reliability). As warmth typically informs active help, the null effect on active help is unexpected considering the significant effect of pet status on warmth. Thus, the positive effect of pet status on warmth does not appear to translate into a (positive) effect of pet status on active help, thereby not supporting the BIAS map (Sevillano & Fiske, 2016b), and possibly indicating separability of SCM perceptions of animals (e.g., warmth) and BIAS map behavioural intentions (e.g., active help) in the context of pet status. Pet status may not have informed help intentions as a) pet animals may be assumed to receive help from their guardians, whilst b) non-pet animals may be assumed to not require human help. Thus, participants' perceptions of how much the animal requires help, combined with whether the animal is already receiving help from other people, may be impacting how willing participants are to provide help (see Section 7.3.4.2. for further discussion).

Regarding harm intentions, pet status caused less active harm and passive harm from pre- to post-manipulation (small-sized), supporting **H2a** and **H2c.** However, pet status was only superior to a lack of pet status in decreasing post-manipulation passive harm (small-sized; agreeing with **H2c**), whereas post-manipulation active harm did not differ across pet status conditions (partially not supporting **H2a**). A lack of pet status had no effect on active and passive harm from pre- to post-manipulation. Overall, therefore, pet status decreases passive harm from pre- to post-manipulation and compared to a lack of pet status, whilst pet status only decreases active harm from pre- to post-manipulation. However, both effects should be interpreted with caution due to floor effects (active harm) and inadequate scale reliability (passive harm). If these findings are robust, the lack of difference between the pet status conditions in post-manipulation active harm may be due to floor effects in active harm. That is, participants were highly unwilling to actively harm the animal, regardless of whether the animal was a pet or not. However, it is still unclear why there was a pre- to post-manipulation reduction in active harm within the pet status condition. It may be that learning that an animal is a pet made participants even more unwilling to actively harm the animal at post-manipulation compared to pre-manipulation. The lack of floor effects in passive harm may explain why post-manipulation passive harm was lower in the pet status condition (vs. lack of pet status). These effects on harm intentions were all small-sized, so may have lower practical significance.

7.3.4.1.2. H3-H4: Exploring Mediational Relationships Between Pet Status and Behavioural Intentions Through Warmth/Competence.

As expected, and aligning with previous BIAS map literature with animals (Sevillano & Fiske, 2016b), post-manipulation warmth mediated the relationship between pet status and post-manipulation active harm (**H3b**). This mediation occurred in the expected direction, whereby pet status (vs. lack of pet status) increased warmth, which in turn decreased active harm. Unlike for active harm, warmth did not mediate the relationship between pet status and active help (**H3a**), whilst competence did not mediate the relationships between pet status and passive help (**H4a**), nor between pet status and passive harm (**H4b**). These findings mostly do not support the BIAS map (Sevillano & Fiske, 2016b) in the context of pet status, indicating warmth mediates the relationship between pet status and active harm only but not active help, and competence does not mediate between pet status and passive behavioural intentions.

7.3.4.1.3. Exploring Associations Between Warmth, Competence and Behavioural Intentions.

Despite mostly a lack of significant mediations, inspection of path *b*s from the mediation analyses demonstrated greater warmth predicted greater active help and lower active harm, whilst greater competence predicted greater passive help. However, competence did not predict passive harm. Therefore, these path *b* findings provide some support for the BIAS map, but not full support (e.g., competence may not inform passive harm).

7.3.4.1.4. Warmth/Competence Perceptions and Behavioural Intentions Towards the Animal Differ from Zero.

Like Studies 3-4, the unknown animal here was deemed significantly warmer and more competent than zero. Additionally, participants were significantly more willing to actively or passively help, and significantly less willing to actively or passively harm, the animal compared to zero. Thus, the current study combines with Studies 3-4 to evidence a positivity bias in perceptions of and behavioural intentions towards animals.

7.3.4.2. Limitations of the Current Study and Directions for Future Research.

The current study has some limitations to be addressed in future research: a) lack of measurement of possible mediators, and b) effects of the pet status label occurring due to aligning with the animal's guardian rather than with the animal themselves.

Firstly, as considered within Section 7.3.4.1.1., the pet status label may have affected warmth and active help due to assumed domestication and tameness acting as mediators of the effect. That is, pet status may have prompted participants to assume the pet animal is domesticated, and therefore warmer by temperament than a non-pet (wild) animal. For instance, domestication of animals is often associated in part with the animals' increased pro-sociality towards humans (Hare et al., 2002).[33] Conversely, a non-pet (wild) animal may be correctly or incorrectly perceived as dangerous to approach, and therefore deemed less warm. Indeed, the descriptions from participants' imagined contact with the unknown animal in Study 4 indicated many participants viewed the unknown animal as potentially dangerous,

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[33] Although domestication and pro-sociality do not equate to the same process (Losey, 2021).

and harmful animals are perceived as having lower moral standing than non-harmful animals (Piazza et al., 2014). Therefore, warmth may have increased not due merely to the pet status label, but instead due to implicit assumptions about an animal's harmless or harmful nature based on the animal's presumed domestication as a pet (vs. not). Whilst this effect does not undermine the pet status effect, it does introduce two additional possible mediators (presumed domestication, perceived harmfulness) not measured within this study. Future research should therefore measure perceived domestication and harmfulness and test effects of these variables on warmth. Research should also test if merely labelling an animal as 'domesticated' (vs. not) impacts the animal's warmth.

Secondly, the pet status label may elicit greater warmth and fewer harm intentions not due to improved perceptions of the animal themselves, but due to perceptions of and implied association with the animal's presumed guardian. For instance, the pet animal may be deemed warm only as an extension of being associated with their human guardian, rather than being perceived as warm in their own right. For example, dogs have been found to be viewed more as people when they are associated with humans, especially women (Chambers et al., 2020). Thus, an animals' implied association with humans (e.g., a guardian) due to being a pet may be improving the animal's warmth within the current study, rather than pet status enhancing the animal's warmth in and of itself. Such effects may also extend to harm intentions, whereby an animals' implied association with humans due to being a pet may reduce harm intentions towards them, due to the animals' increased perceived personhood. Additionally, people may be less willing to harm a pet (vs. non-pet) animal in case this harm would be hurtful to the animal's guardian, and not necessarily because the harm would be hurtful to the animal themselves. Future research could measure salience of the human guardian across pet status conditions through asking participants to what extent they thought of a human guardian after reading the pet status condition (vs. no pet status). Theoretically, the human guardian should be more salient in the pet status (vs. not) condition, and this salience should be tested as a mediator between pet status and warmth and harm intentions.

7.3.4.3. Conclusion.

The current study highlights the role of pet status in informing people's perceptions of animals' warmth, but not animals' competence. Thus, as dogs are deemed pet animals more than pigs (Study 1) and pet animals are deemed warmer than non-pet animals (the current study), pet status could possibly explain why dogs are deemed warmer than pigs, whilst possibly failing to explain the dog vs. pig competence gap. However, this suggestion would need to be explicitly tested in future research by applying pet status back to dogs and pigs specifically. Alongside warmth, the study uniquely demonstrates how pet status may decrease active and passive harm, from pre- to post-manipulation or (passive harm only) compared to a lack of pet status. However, the effects of pet status on harm intentions found here may be unstable due to floor effects and inadequate scale reliability. Unexpectedly, pet status had no significant effects on active and passive help towards animals and therefore may be unable to explain the pet speciesism gap in active and passive help for dogs and pigs (Studies 3 and 5). Finally, the study supports a mediational relationship in line with the BIAS map for warmth and active harm, but does not support such mediations for warmth and active help, nor for competence and passive behavioural intentions in the context of pet status.

As the current effects of pet status on harm intentions must be interpreted with caution (due to floor effects or inadequate scale reliability) and are therefore not necessarily robust, pet status was not tested causally in an additional experiment with dogs and pigs. That is, this thesis only tests for causal effects on SCM/BIAS map perceptions of dogs and pigs with variables that have either robust causal effects on behavioural intentions towards unknown animals, or failed manipulation checks by implementing amended manipulations (Section 1.4.). Instead, future research could implement the same pet status manipulation used within this study for unknown animals but utilise more subtle measures of harm intentions (to avoid floor effects), to test if the effects of pet status on harm intentions found here are robust. For example, whilst participants are extremely unwilling to '*kill*' or '*exterminate*' an animal, they may be more willing to engage in less violent active harm behaviours like '*shout at*' an animal or, due to prevalent animal-use behaviours (Gradidge et al., 2021a), be more willing to actively harm an animal for human benefit (e.g., '*use [an animal] for research*', '*eat*'). Measurement of less violent and/or prevalent harm behaviours may reduce or eliminate floor effects on the harm intentions subscales and enable effects of pet status on harm intentions to be tested for robustness.

The current study has limitations including lack of measurement of possible mediators, and positive pet status effects on warmth and active help possibly arising from the animals' association with a human guardian. Future research should test possible mediators (perceived domestication, harmfulness), and determine the salience of human guardians when considering pet status. To conclude, the current study causally manipulated pet status for the first time, uniquely revealing an effect of pet status on an unknown animal's warmth yet finding null effects on competence and help intentions. Additionally, whilst pet status informed active and passive harm towards an unknown animal, issues with the measurements for harm intentions (floor effects, inadequate reliability) mean these conclusions must be interpreted with caution. The current study uniquely demonstrates possible strengths (e.g., warmth) and limitations (e.g., competence, behavioural intentions) of pet status in explaining perceptions of animals.

7.4. Overall Discussion

Through a pilot study, a pet status manipulation was developed and piloted which successfully manipulates pet status. As such, the pet status manipulation was implemented within Study 6, to test if pet status may be a cause of pet speciesism. Overall, Study 6 found that pet status causally informs animals’ warmth, but not competence, and may also inform harm intentions, but not help intentions, towards animals.

Chapter 8. Discussion and Conclusions

8.1. Discussion of all Findings

This thesis has a) extended pet speciesism literature to consistently evidence pet speciesism through the SCM/BIAS map, b) provided some evidence for the BIAS map as an extension of the SCM, partly supporting Sevillano and Fiske (2016a, 2016b, 2019), and c) uniquely explored extrinsic causes of pet speciesism. All effects have been found with the SCM/BIAS map as the psychological framework, whereby pet speciesism has been operationalised through an animals' warmth (perceived good intent) and competence (perceived ability to enact intent), alongside active help (intentional and effortful aid), passive help (aid which requires minimal effort), active harm (intentional and effortful harm), and passive harm (harmful and exclusionary behaviour which requires minimal effort) towards the animal. I discuss pet speciesism effects, extension of the BIAS map, and causes of pet speciesism individually below.

8.1.1. Effects of Species on SCM/BIAS Map Variables (Evidence for Pet Speciesism)

Extending previous pet speciesism literature (Bilewicz et al., 2011; Caviola & Capraro, 2020; Gradidge et al., 2021b), the current project has consistently evidenced pet speciesism effects: Dogs are deemed warmer and more competent than pigs (Studies 1, 3 and 5), and subject to greater active and passive help and less active and passive harm than pigs (Studies 3 and 5), with effects being mostly of medium size or larger. The current project also uniquely compared perceptions of dogs vs. pigs with an unknown animal (tree kangaroo), finding that tree kangaroos are perceived as unlike pigs on some dimensions (competence, harm intentions; small-sized for competence and passive harm; medium-sized for active harm; Study 3), and like pigs on other dimensions (warmth, help intentions; Study 3). Whilst tree kangaroos themselves are not an ideal 'unbiased' metric (e.g., a positivity bias in Studies 3-4 and 6), these findings may indicate pet speciesism arises from especially positive perceptions of and behavioural intentions towards dogs across all dimensions, combined with more negative perceptions of pigs' competence and greater harm intentions towards pigs. That is, dogs are seemingly perceived as particularly warm and competent, and subject to greater help and lower harm intentions, compared to other animals, whilst pigs are seemingly perceived as less competent and subject to greater harm intentions compared to other animals. This suggestion would mostly agree with previous research regarding perceptions of animals (Sevillano & Fiske, 2016b), whereby dogs, alongside other 'companion' animals, are deemed especially warm compared to all other categories of animals, and more competent compared to most other categories of animals (except 'predators'). In contrast, pigs, alongside other 'prey' animals, are deemed moderately warm, yet low in competence, compared to most other categories of animals (except 'pests'; Sevillano & Fiske, 2016b).

As all animals, including pigs, were viewed with some level of positivity bias (Study 3), the above findings indicate that: a) dogs, pigs, and tree kangaroos are viewed with positivity bias (e.g., a general positivity bias) across SCM/BIAS map dimensions, b) dogs are viewed with an extreme positivity bias across SCM/BIAS map dimensions specific to their species, and c) a general positivity bias is still present for pigs but is diminished in competence and harm intentions. That is, whilst pigs are deemed more competent and subject to less harm intentions than zero, they are still deemed less competent and subject to greater harm intentions than dogs and tree kangaroos.

Due to the limited range of species used within the current project, it is unclear if this general positivity bias extends to all animals or to mammals only. Such a positivity bias may not extend to animals like mosquitoes and flies, which are typically viewed with negative valence (Possidónio et al., 2019), or to animals like sharks which are deemed more competent than the scale midpoint (e.g., possible positivity bias for competence), but less warm than the scale midpoint (e.g., possible negativity bias for warmth; Neves et al., 2022). Thus, positivity and negativity biases may differ across SCM/BIAS map dimensions and depending upon species. Future research needs to test across which types of animals (e.g., non-mammals like insects, reptiles and amphibians), and which dimensions (e.g., warmth vs. competence), the general positivity bias found here extends.

8.1.2. Exploring Associations Between Warmth, Competence and Behavioural Intentions (Evidence for the BIAS map as an Extension of SCM)

The project has partially replicated and extended the SCM/BIAS map to animals in the context of pet speciesism (Sevillano & Fiske, 2016b, 2019). For instance, greater warmth was consistently associated with greater active help across all studies (Studies 2-6), and greater warmth was also associated with lower active harm in the species mediation analyses (Studies 3 and 5), and the pet status mediation analysis (Study 6). Yet warmth was not associated with active harm in the behavioural and subjective self-relevance mediation analyses (Study 2) and familiarity and similarity mediation analyses (Study 4), indicating the relationship between warmth and active harm differs across samples and is unstable.

The relationships between competence and passive behavioural intentions also differ across studies and across timepoints: Greater competence was linked to greater passive help within the Study 3 species mediation analysis pre-manipulation only, the familiarity mediation analysis (Study 4), the Study 5 species and similarity mediation analyses, and the pet status mediation analysis (Study 6). Yet competence was not linked to passive help at post-manipulation within the Study 3 species mediation analysis, nor within the Study 4 similarity mediation analysis. Greater competence was linked to lower passive harm within the Study 3 species mediation analysis post-manipulation only, and within the Study 5 species mediation analysis. Yet competence was not linked to passive harm at pre-manipulation within the Study 3 species mediation analysis, within the similarity and familiarity mediation analyses (Study 4), nor within the pet status mediation analysis (Study

6). These findings indicate the relationships between competence and passive behavioural intentions differ across samples, may vary depending on exposure to a manipulation (e.g., pre- vs. post-manipulation), and are therefore unstable. Overall, whilst this project partly supports the SCM/BIAS map as applied to animals (e.g., the relationship between warmth and active help; Sevillano & Fiske, 2016b, 2019), it also uniquely may not support previous SCM/BIAS map research by finding that the relationships between warmth and active harm, and between competence and passive behavioural intentions, do not always replicate.

8.1.3. Exploring Possible Causes of Pet Speciesism: Behavioural Self-Relevance, Subjective Self-Relevance, Familiarity, Similarity, and Pet Status

Most importantly, this thesis has uniquely explored extrinsic causes of pet speciesism, which were informed by social psychological (Pettigrew & Tropp, 2006), anthrozoological (Possidónio et al., 2019), and speciesism (Loughnan et al., 2010) literature bases, and subsequently identified as significant regressors of perceptions of dogs and pigs (Study 1). These possible extrinsic causes were: behavioural and subjective self-relevance (behavioural and psychological investment in meat consumption respectively), familiarity (quantity and/or perceived quality of contact), similarity (perceived shared attributes of an animal to humans), and pet status (an animals' societal status as a companion animal or not). I discuss findings for these possible causes below.

8.1.3.1. Behavioural and Subjective Self-Relevance as Possible Causes of Pet Speciesism.

Surprisingly, despite being the most widely evidenced hypothesised causes of pet speciesism from previous literature (Gradidge et al., 2021a; Loughnan et al., 2010; Piazza & Loughnan, 2016), effects of behavioural and subjective self-relevance on perceptions of and behavioural intentions towards animals are mostly not found throughout this thesis. That is, behavioural and subjective self-relevance did not causally affect warmth, competence, active help, active harm, and passive help (Studies 2-3). Passive harm did reduce after (vs. before) reading the behavioural self-relevance manipulation in Study 3 (small-sized). However, as behavioural self-relevance was manipulated within Study 3 as a within-subjects pre- to post-manipulation variable, the effect on passive harm may be due either to the salience of behavioural self-relevance, or due to reading text about the animal regardless of behavioural self-relevance. Additionally, this finding on passive harm should be interpreted with caution due to floor effects, whereby most participants were unwilling to passively harm the animal, and inadequate scale reliability. Finally, even if the reduced passive harm in Study 3 is due to behavioural self-relevance, this finding cannot explain why people show more passive harm towards pigs than dogs. That is, although pigs are behaviourally self-relevant whilst dogs are not, behavioural self-relevance in Study 3 led to reduced (not increased) passive harm.

Overall, the contributing roles of behavioural and subjective self-relevance to pet speciesism are limited, whereby behavioural and subjective self-relevance may not contribute to an animal's lower warmth, lower competence, or more negative behavioural intentions towards the animal. Therefore, although pigs are typically behaviourally and subjectively self-relevant whilst dogs are not, behavioural and subjective self-relevance may not explain why pigs are deemed less warm and competent and subject to more negative behavioural intentions than dogs. This thesis thus does not support self-relevance literature (Gradidge et al., 2021a; Loughnan et al., 2010; Piazza & Loughnan, 2016), by finding no evidence that behavioural and subjective self-relevance cause pet speciesism.

8.1.3.2. Similarity as a Possible Cause of Pet Speciesism.

Unlike behavioural and subjective self-relevance, similarity represents a robust cause of pet speciesism, agreeing with previous literature (Batt, 2009; Kozachenko & Piazza, 2021). Specifically, the current project has consistently identified that similarity causes pet speciesism in warmth and competence, whereby similarity increases animals' warmth and competence from pre- to post-manipulation (small-sized for warmth across Studies 4-5 and competence in Study 5, medium-sized for competence in Study 4), and as compared to dissimilarity information (medium-sized for warmth across Studies 4-5 and competence in Study 5, large-sized for competence in Study 4). Thus, when applied to dogs and pigs specifically, dogs are deemed warmer and more competent than pigs as a) dogs are deemed more similar to humans than pigs are (Studies 1 and 5), and b) similar animals are deemed warmer and more competent than dissimilar animals (Studies 1 and 4 -5).

Effects of similarity sometimes extend to active help, whereby similarity consistently increases active help from pre- to post-manipulation (small-sized across Studies 4-5). However, despite this pre- to post-manipulation increase, similarity is superior to dissimilarity information only in informing active help towards known animals (dogs and pigs; medium-sized ; Study 5), and may not inform active help towards unknown animals (i.e., tree kangaroos; Study 4). As similarity (vs. dissimilarity) causes greater post-manipulation active help with dogs and pigs specifically (Study 5), this finding helps explains the pet speciesism gap in active help. That is, as a) dogs are deemed more similar to humans than pigs are (Studies 1 and 5), and b) similar (vs. dissimilar) animals are subject to more active help (Study 5), dogs' greater perceived similarity to humans contributes to greater active help for dogs than pigs. Additionally, this effect of similarity on active help is of medium size (when compared to dissimilarity information), indicating similarity may have practical significance for interventions by improving active help.

Whilst similarity clearly explains the pet speciesism gaps in warmth, competence and active help, similarity had non-significant effects on passive harm across Studies 4-5, meaning similarity may not explain why pigs are subject to greater passive harm than dogs (although passive harm findings should be interpreted with caution due to inadequate scale reliability across Studies 4-5). Additionally, similarity had differing effects on passive help and active harm, thereby complicating the role of similarity in informing dogs’ and pigs’ passive help and active harm. I discuss these differing effects below.

Firstly, whilst similarity increased passive help towards an unknown animal from pre- to post-manipulation (Study 4; small-sized), similarity did not increase passive help towards known animals (dogs and pigs) from pre- to post-manipulation (Study 5). Thus, whilst similarity explains increased passive help towards unknown animals, similarity may not explain the pet speciesism gap in passive help, as similarity was not found to cause greater passive help for dogs or pigs. Additionally, the significant effect from Study 4 may not be robust, as there was inadequate scale reliability in passive help across Studies 4-5.

Secondly, similarity informs active harm towards known animals (dogs and pigs; Study 5), but may not inform active harm towards unknown animals (i.e., tree kangaroos; Study 4). Specifically, similarity was not found to affect active harm in Study 4 with unknown animals, whilst similarity decreased active harm towards dogs and pigs in Study 5 from pre- to post-manipulation (small-sized), and as compared to dissimilarity information (small-sized). Thus, similarity seemingly informs active harm towards known species only, and, regardless of the known species (dog or pig), active harm decreases following similarity information. Similarity may therefore explain the pet speciesism gap in active harm. Specifically, as a) dogs are deemed more similar to humans than pigs are (Studies 1 and 5), and b) similar animals are subject to lower active harm (Study 5), dogs’ greater perceived similarity to humans may contribute to lower active harm towards dogs compared to pigs. Thus, perceived similarity of dogs (but not pigs) to humans may act as a protective factor against active harm towards dogs and may explain why dogs are subject to less active harm than pigs. However, findings of similarity on active harm may not be robust and should be interpreted with caution, as active harm suffered from floor effects across Studies 4-5.

Alongside effects of similarity, dissimilarity had pre- to post-manipulation effects on warmth and/or competence depending on whether the animal was known or unknown. Specifically, dissimilarity reduced an unknown animal's warmth and competence from pre- to post-manipulation (small-sized; Study 4), yet only reduced a known animal's competence from pre- to post-manipulation (medium-sized; Study 5), and not their warmth. As dissimilarity had no pre- to post-manipulation effect on known animals' warmth, this finding indicates dissimilarity may not explain pet speciesism differences in warmth. However, as dissimilarity had a pre- to post-manipulation effect on known animals' competence, this finding suggests dissimilarity explains pet speciesism differences in competence. That is, as a) pigs are deemed more dissimilar to humans than dogs are (Studies 1 and 5), and b) dissimilarity causes a decrease in competence (Studies 4-5), pigs' greater perceived dissimilarity to humans explains why pigs are deemed less competent than dogs. Thus, dissimilarity meaningfully explains the pet speciesism gap in competence.

8.1.3.3. Familiarity as a Possible Cause of Pet Speciesism.

Familiarity was unexpectedly difficult to manipulate, despite previously successful imagined contact manipulations with animals (Auger & Amiot, 2019b), and evidence for the mere exposure effect (e.g., Stafford & Grimes, 2012). The familiarity manipulation via the mere exposure effect in this thesis may have failed to elicit familiarity due to its reliance on absolute exposure (presenting nine photographs of the animal), instead of relative exposure (presenting nine animal photographs alongside a smaller number of photographs of alternative stimuli). For example, Mrkva and Van Boven (2020) indicate relative exposure is more effective than absolute exposure, as relative exposure enhances the salience of stimuli, whilst absolute exposure enables mere exposure to stimuli only and does not necessarily enhance salience. That is, salience arises due to stimuli being presented more frequently than other stimuli, and salience is by nature comparative and dependent upon the presentation of alternative stimuli alongside target stimuli (Mrkva & Van Boven, 2020). Overall, Study 4's predominantly null effects of familiarity may therefore be due to a) failure in the familiarity manipulations to elicit familiarity, indicating future research should incorporate non-target stimuli within the familiarity manipulation, or b) genuine lack of effects of familiarity on perceptions of animals.

The effect of familiarity on passive help, whereby familiarity decreased passive help from pre- to post-manipulation (small-sized; Study 4), may arise from assumptions about the unknown animal acting as moderators, like assumed harmfulness (although this effect should be interpreted with caution due to inadequate scale reliability). Overall, whilst any contributing role of familiarity to pet speciesism cannot be determined from this thesis due to failed familiarity manipulations, the project has uniquely highlighted how imagined contact and mere exposure effect do not always extend to animals, which does not support previous literature (Auger & Amiot, 2019b).

8.1.3.4. Pet Status as a Possible Cause of Pet Speciesism.

Whilst pet status increases an animals' warmth from pre- to post-manipulation and as compared to a lack of pet status (small-sized), effects of pet status on active and passive harm may be unstable due to limitations with the measures (e.g., unreliable scale; floor effects; Study 6). That is, whilst pet status decreased active and passive harm from pre- to post-manipulation (small-sized) and decreased post-manipulation passive harm as compared to a lack of pet status (small-sized), these findings may not be robust due to the inadequate measures utilised for these variables. Due to this lack of robust causal effects on behavioural intentions, a subsequent study to test effects of pet status on perceptions of, and behavioural intentions towards, dogs and pigs was not conducted within this thesis (Section 7.3.4.3.).

Overall, the current project uniquely highlights limitations of previous pet status and categorisation literature (Signal et al., 2018; Taylor & Signal, 2009), which has previously been correlational, and has focussed on perceptions of and/or feelings towards animals, by showing the possible strengths (e.g., warmth) and limitations (e.g., competence, behavioural intentions) of pet status in explaining perceptions of animals.

8.1.3.5. Summary of Findings: Explaining Pet Speciesism Through Possible Causes.

To summarise, the current project uniquely contributes to explaining the pet speciesism gap in warmth, whereby dogs are deemed warmer than pigs, as dogs are deemed a) more similar to humans, and b) more as pet animals than pigs. Similarity and pet status of dogs in turn increases dogs' warmth, thus contributing to the pet speciesism gap in warmth. Neither behavioural nor subjective self-relevance contribute to this pet speciesism gap in warmth, whilst effects of familiarity on warmth are as yet undetermined due to failed familiarity manipulations.

The current project also uniquely contributes to explaining the pet speciesism gap in competence, whereby dogs are deemed more similar to humans than dogs are, and pigs are deemed more dissimilar to humans than dogs are. Similarity of dogs and dissimilarity of pigs in turn increases dogs' competence and decreases pigs' competence, contributing to the pet speciesism gap in competence and explaining why dogs are deemed more competent than pigs. There was a lack of effects of all other extrinsic variables (behavioural self-relevance, subjective self-relevance, familiarity, pet status) on competence.

Extending to behavioural intentions, the current project contributes to explaining pet speciesism gaps in active help and active harm through similarity. Specifically, as dogs are perceived as more similar to humans than pigs are, this greater perceived similarity of dogs explains why people are more willing to actively help, and less willing to actively harm, dogs than pigs. Additionally, the pet speciesism gaps in active harm and passive harm may be explained by pet status, whereby pet status reduces active and passive harm, but this finding has not yet been tested directly with dogs and pigs and may not be robust due to floor effects and unreliable scales within Study 6 in this thesis. Behavioural self-relevance, subjective self-relevance, and familiarity do not appear to meaningfully contribute to understanding the pet speciesism gaps in any behavioural intentions. Meanwhile, similarity seems to be unable to explain the pet speciesism gaps in passive help and passive harm, and pet status may not explain the pet speciesism gaps in active help and passive help.

Overall, the current project highlights that the factor which explains pet speciesism gaps across most SCM/BIAS map dimensions is (dis)similarity, contributing to dogs' greater warmth, dogs' greater competence, pigs' lower competence, greater active help towards dogs, and lower active harm towards dogs. Together, this thesis indicates pet speciesism gaps are informed by extrinsic factors as follows: a) warmth and active harm are informed by similarity and possibly pet status, b) competence is informed by (dis)similarity, c) active help is informed by similarity, and d) passive harm is possibly informed by pet status. Passive help is the only pet speciesism gap which has not yet been found to be informed by extrinsic factors covered within this thesis, whilst other extrinsic factors within this thesis either do not seem to meaningfully contribute to pet speciesism (behavioural self-relevance, subjective self-relevance), or require an amended manipulation to causally test their contribution to pet speciesism (familiarity). Overall, the thesis uniquely contributes a broader understanding of extrinsic causes of pet speciesism, and, due to testing causal effects of extrinsic factors on pet speciesism for the first time, highlights challenges to be addressed in future research with both causal manipulations for extrinsic factors (e.g., familiarity), and measurement of SCM/BIAS map variables (e.g., less severe harm intentions).

8.1.4. Exploring Mediational Relationships Between Possible Causes/Species and Behavioural Intentions Through Warmth/Competence

After exploring possible extrinsic causes of pet speciesism, mediational analyses extended the BIAS map further to determine mediational relationships of warmth and competence between the possible extrinsic causes and active and passive behavioural intentions respectively. Overall, the BIAS map was not always supported in the mediations. For example, warmth did not significantly mediate the relationships between behavioural and subjective self-relevance and active help and active harm (Study 2), familiarity and active help or active harm (Study 4), similarity and active harm (Study 4), or pet status and active help (Study 6). In addition, competence did not significantly mediate the relationships between species and passive help either across timepoints (Study 5) or post-manipulation only (Study 3), species and passive harm (Studies 3 and 5), familiarity and passive help and passive harm (Study 4), similarity and passive harm (Study 4), similarity and passive help within Study 4, or pet status and passive help and passive harm (Study 6). However, warmth did significantly mediate the relationships between species and active help and active harm (Studies 3 and 5), similarity and active help (Studies 4-5), and pet status and active harm (Study 6). Competence significantly mediated the relationships between species and passive help pre-manipulation within Study 3 (but not Study 5), and similarity and passive help within Study 5 (but not Study 4). The non-significant mediations here may be arising from lack of effects of the IVs on the DVs and/or mediators, or due to differing relationships between warmth and active harm, and between competence and passive behavioural intentions.

8.2. Theoretical and Practical Implications

8.2.1. Theoretical Implications

This thesis has theoretical implications for multiple literature bases, including speciesism, human-animal interaction, and social psychological literature. For example, the project uniquely sheds light on similarity as an explanation for the pet speciesism gaps in warmth, competence, and active help. This finding a) supports previous human-animal interaction literature on the important role of similarity in informing perceptions of animals (Batt, 2009; Prguda & Neumann, 2014), b) uniquely extends this previous literature to the SCM/BIAS map specifically, and c) demonstrates people do not always disregard similarity information about pigs (unlike Piazza & Loughnan, 2016). Current findings may differ to Piazza and Loughnan (2016) due to variations in manipulations across studies, whereby this thesis manipulated overall similarity (vs. dissimilarity) to humans and referred to multiple attributes (behaviour, intelligence, sociality, emotionality), whereas Piazza and Loughnan (2016) manipulated intelligence only. As such, whether or not people disregard similarity information may depend upon the exact attribute being manipulated (e.g., intelligence), and may not occur with other attributes (e.g., behaviour), or when manipulating overall similarity.

The project also demonstrates that behavioural and subjective self-relevance may fail to explain pet speciesism gaps across SCM/BIAS map dimensions, which does not support extensive previous speciesism literature and motivated cognition theory (Gradidge et al., 2021a; Loughnan et al., 2010, 2014; Piazza & Loughnan, 2016). Such findings may differ due to the exact manipulations used: For example, Loughnan et al. (2010) manipulated (behavioural) self-relevance through actual meat consumption, whilst this thesis employed imagined scenarios. Thus, for behavioural self-relevance to affect perceptions of animals, it may need to be elicited through actual behaviour (e.g., meat consumption) rather than imagined behaviour. Alternatively, these differing findings may be arising from the application of (behavioural) self-relevance to different animals, whereby this thesis manipulated the behavioural self-relevance of pigs, and Loughnan et al. (2010) manipulated the (behavioural) self-relevance of cows.

Surprisingly, the current project has revealed limitations of widely evidenced psychological measures to elicit familiarity, including imagined contact with animals (Auger & Amiot, 2019b), and the mere exposure effect (Mrkva & Van Boven, 2020; Newell & Shanks, 2007; Stafford & Grimes, 2012). These findings have implications for social psychological literature, like imagined contact theory (Crisp & Turner, 2009), by demonstrating that imagined contact with animals as manipulated within this thesis may not effectively elicit familiarity. By considering differences between how familiarity was manipulated within this thesis and previous literature (Auger & Amiot, 2019b; Cerrato & Forestell, 2022), imagined contact with animals may instead only elicit familiarity and inform perceptions of and/or behavioural intentions towards animals when a) imagined contact is described as positive (vs. neutral within this thesis; i.e., Auger & Amiot, 2019b), b) the animal is described as not being dangerous, and c) implicit measurements of prejudice (e.g., Implicit Association Test) are implemented in combination with, or instead of, explicit measures (i.e., Cerrato & Forestell, 2022).

In addition, the project has shown that previous literature on categorisation of animals (e.g., pet status; Signal et al., 2018; Taylor & Signal, 2009) may not extend to causal effects on some SCM/BIAS map variables. Where effects of pet status have been identified here, they are restricted to harm intentions and warmth. Thus, this thesis uniquely demonstrates how categorisation (e.g., pet status) informs perceptions of animals (e.g., warmth as found here or empathy as found within previous research; Signal et al., 2018), yet this effect on perceptions may not extend to help intentions and may therefore not sufficiently explain, or be able to change, real-world behaviour. Furthermore, the lack of significant relationships between profit status and dogs' and pigs' warmth and competence from Study 1 may indicate an animal's categorisation as a commodity (vs. not) does not negatively impact upon perceptions of the animal, thus not supporting previous research comparing perceptions of 'food' vs. non-'food' animals (Bastian et al., 2012a).

Overall, the current project uniquely identifies and systematically explores extrinsic causes of pet speciesism, thus adding to emerging pet speciesism literature (Caviola & Capraro, 2020), expanding upon previous correlational research (Signal et al., 2018), and extending previous SCM/BIAS map research (Sevillano & Fiske, 2016b) by applying the SCM/BIAS map for the first time to explore pet speciesism.

8.2.2. Practical Implications

This thesis has practical implications for the development of interventions to reduce or prevent pet speciesism. For instance, the project indicates that, contrary to previous suggestions and research (Gradidge & Zawisza, 2019; Piazza & Loughnan, 2016), similarity is a strong contender for interventions targeting variables like pigs' warmth and competence and active help towards pigs. Thus, emphasising the similarity of pigs by demonstrating their human-like capabilities (e.g., intelligence, sociability) should enable pigs to be deemed warmer and more competent, and be subject to greater active help, both absolutely (pre- to post-manipulation) and relatively (decreasing the gap between dogs' and pigs' warmth, competence, and active help). Whilst not explicitly tested within this thesis, improving warmth, competence, and active help towards pigs may more broadly improve pigs' welfare through reducing pig meat consumption, and enhancing the public image of pigs and encouraging advocacy for pig welfare. Such advocacy is sorely needed considering regular pig welfare violations (e.g., tail docking; De Briyne et al., 2018), whilst (pig) meat consumption must urgently reduce considering the rising global climate and its associated disastrous phenomena (e.g., greenhouse gas emissions; Godfray et al., 2018). Reductions in meat consumption, which could be achieved through interventions informed by this thesis, are thus a crucial part of the solution for slowing climate change (Springmann et al., 2018).

The current project also contributes practically to the development of interventions to help vulnerable animal groups beyond pigs, including ‘pest’ animals like rats and bats, endangered animals, and other animals used for meat production. For instance, highlighting similarities of vulnerable animals (e.g., ‘pest’, endangered, or ‘food’ animals) to humans may bolster support and increase advocacy for them by improving their warmth and competence. Indeed, recent research on shark conservation shows that, the warmer sharks are perceived as, the more willing people are to support their conservation (Neves et al., 2022). Such interventions are especially important considering the biodiversity crisis, whereby approximately 16,000 animal species are at threat of extinction (IUCN, 2021), alongside risks to ecological functions and whole ecosystems (Valiente-Banuet et al., 2015). This crisis has implications not only for animals themselves, due to threats to their survival, but also for human health like increased risk of zoonotic disease (Keesing & Ostfeld, 2021). Thus, psychological interventions to reduce the biodiversity crisis (e.g., emphasising animals’ similarity to humans) are crucial to protect human and animal welfare. This thesis uniquely contributes to developing these interventions by demonstrating the importance of similarity in informing animals’ warmth and competence, and active help towards them, alongside providing a simple but effective text manipulation of similarity to implement within interventions.

Overall, whilst emerging SCM/BIAS map literature has demonstrated how animals are perceived (Neves et al., 2022; Sevillano & Fiske, 2016a, 2016b, 2019), the current project extends upon this literature to uniquely explore why some animals (e.g., dogs) are deemed warmer and more competent, and are subject to greater help and lesser harm, whilst other animals (e.g., pigs) are not. Exploring why some animals are perceived more negatively than others is imperative for developing interventions to improve perceptions of animals, as, by determining why animals are perceived as they are, causal factors can be removed or overcome. Thus, this thesis has identified causes of pet speciesism, such as (dis)similarity and possibly pet status, and developed causal manipulations of extrinsic factors, which provide future researchers with information and tools to develop research-driven interventions.

8.3. Limitations of the Project and Associated Directions for Future Research

The project has some limitations in scope which should be addressed in future research: a) lack of generalisability to other animals, b) lack of exploration of intrinsic factors, and c) possible culture boundedness. Additionally, the project has some methodological limitations regarding manipulations which should be resolved in future research: a) ineffectiveness of manipulations, perhaps due to the use of imagined scenarios, and b) issues with manipulation checks regarding their inconsistent use and transparency.

8.3.1. Limitations in Scope

Firstly, as dogs and pigs represent a good 'matched pair' due to their multiple ostensible similarities (Section 1.1.), the current project focussed only on dog vs. pig pet speciesism. Whilst this focus on dogs and pigs (instead of cats vs. pigs, or dogs vs. cows) enabled possible moderators (size, diet, domestication) to be eliminated, this spotlight on dogs and pigs means current findings do not necessarily generalise to perceptions of other animals. Future research should determine if pet speciesism and similarity as an extrinsic cause of pet speciesism generalise to other animals: For example, Sevillano and Fiske (2016b) identified multiple species in the 'prey' cluster (like pigs) that people may equally be prejudiced against, like cows, ducks, and rabbits. Sevillano and Fiske (2016b) identified multiple other species in the 'companion' cluster (like dogs) that people may equally be prejudiced towards, like horses, cats, and monkeys. Thus, a comparison of alternative forms of speciesism with animals from the 'companion' and 'prey' clusters (e.g., horses vs. cows, which are relatively matched on diet, size, and social structure) would help determine if current findings apply more generally to ‘companion’ vs. ‘prey’ animals, or to dogs vs. pigs specifically. Additionally, such future research would determine if the extreme positivity bias found with dogs applies to other ‘companion’ animals, and if the reduced positivity bias found with pigs applies to other ‘prey’ animals.

Secondly, this thesis intentionally excluded and attempted to reduce effects of intrinsic factors (e.g., through the novel animal paradigm), so individual causal contributions of extrinsic variables to pet speciesism could be tested without the presence of moderators. However, measurement of both intrinsic and extrinsic factors would be beneficial to forming a complete view of pet (and other forms of) speciesism and its causal pathways. For instance, as discussed in Section 1.3, extensive research demonstrates the importance of intrinsic factors in informing peoples’ perceptions of animals (e.g., appearance, Archer & Monton, 2011; behaviour; Pérez Fraga et al., 2021), whilst this thesis demonstrates the crucial role of perceived similarity (an extrinsic factor) in informing perceptions of animals. Future research should test the relative contributions of intrinsic and extrinsic factors to pet speciesism by measuring multiple intrinsic (e.g., appearance, responsiveness) and extrinsic factors (e.g., similarity), and utilising structural equation modelling to identify intrinsic and/or extrinsic pathways which determine peoples’ perceptions of, and behavioural intentions towards, animals.

Finally, although all studies within this thesis intentionally recruited international, culturally heterogenous samples to maximise generalisability, some of the studies within the current project (Studies 3 and 5) are necessarily culture-bound by excluding participants who indicated their culture and/or religion does not view dogs as companions or pigs as ‘food’. Whilst these exclusions were necessary to ensure results were not biased by cross-cultural differences, these exclusions mean that cross-cultural variability was reduced instead of directly investigated. Therefore, it is unclear if people within cultures which do not keep dogs as companion animals and/or do not consume pigs as food view dogs and pigs in similar ways as within this thesis (i.e., if they exhibit dog vs. pig pet speciesism). Future research should directly compare participants from cultures who view dogs as companion animals and pigs as ‘food’ (vs. not) to test if dog vs. pig pet speciesism occurs across these cultures, or only in the former cultures, and thereby elucidate cultural factors which cause or moderate pet speciesism. Research may also more specifically explore if speciesism occurs against different animals by people in cultures which do not view dogs as companion animals and pigs as ‘food’, and if and how people within these cultures have similar contradictory relationships with animals (i.e., loving some yet consuming others; Gradidge et al., 2021a; Joy, 2010). Therefore, research needs to determine which animals people within different cultures are prejudiced against and towards, such as by asking people from different cultures to rate different animals on their warmth and competence (like Sevillano & Fiske, 2016b), and how people within different cultures are prejudiced against or towards animals, such as by exploring if people within different cultures have similar animal stereotypes (like Sevillano & Fiske, 2016b), and if extrinsic and intrinsic causes of speciesism apply across cultures.

Beyond Studies 3 and 5, the remaining studies (Studies 1-2, 4 and 6) are likely to be less culture-bound as they recruited international, culturally heterogenous samples, without exclusions based on whether participants’ culture and/or religion does not view dogs as companion animals and pigs as ‘food’. Additionally, Studies 2, 4 and 6 all explored perceptions of a novel animal only, and not perceptions of dogs and pigs, which means cultural bias and preconceptions in perceptions of the target animal should be reduced. However, due to utilising convenient and accessible volunteer samples, Studies 1-2, 4 and 6 still had an over-representation of participants from countries like the United Kingdom

(32.9% to 54.6% participants of United Kingdom/British nationality; 46.5% to 70.4% participants living within the United Kingdom), meaning findings from these studies may not generalise to all people. Future research should explore more specifically if culture moderates the effects of extrinsic factors on perceptions of animals by directly comparing participants from different cultures utilising quota sampling, to specifically determine if extrinsic factors (e.g., similarity) have the same effects on perceptions of animals cross-culturally.

8.3.2. Methodological Limitations

Firstly, manipulations were frequently found to be ineffective at manipulating their intended variable (i.e., behavioural self-relevance, subjective self-relevance, and familiarity), which limited the ability to explore any causal role of these variables in pet speciesism. This ineffectiveness of the self-relevance and familiarity manipulations may arise from the fact that these manipulations were imagined scenarios. Whilst previous research has indicated that imagined scenarios are effective with animals (Auger & Amiot, 2019), and imagined scenarios were chosen for ease of administration of the manipulations, these imagined components may have led the manipulations to suffer from lack of realism. This potential lack of realism may therefore explain why the imagined manipulations were largely found to be ineffective. Future research could therefore instead utilise real scenarios rather than imagined. For example, real contact with animals could be used to elicit familiarity and thus test any causal effects of familiarity on SCM/BIAS map variables. For self-relevance, participants could be asked to consume real meat (vs. not; manipulation of behavioural self-relevance), akin to Loughnan et al. (2010), which is either prepared to have good taste (e.g., appropriately salted) or bad taste (e.g., overly salted; manipulation of subjective self-relevance). Additionally, although the similarity and pet status manipulations were found to be effective in manipulating similarity and pet status respectively, aspects of these manipulations were also imagined (e.g., '*Imagine reading the following text/sentence in the* *newspaper*'), as well as being very short and simple, which may have reduced believability of the texts. Therefore, effects of the similarity and pet status manipulations may be enhanced further through adding additional text (e.g., on the specific [dis]similarities between humans and the animal) and presenting the manipulations within a news or scientific article format (as opposed to asking participants to imagine the text within an article), akin to Leach et al. (2021).

Secondly, manipulation checks were not always present (Study 2), and, when they were present (Studies 3-6), these checks were often basic, consisting of single items developed by the researcher and sometimes including the same wording as that used within the manipulation (e.g., '*How similar do you perceive the species in the photograph to be to humans?'* for similarity; '*How much do you perceive the species in the photograph to be a 'pet' animal (an animal that is kept within a household as a companion)?*' for pet status). Therefore, whilst the similarity and pet status manipulations were found to be effective when using these manipulation checks, these findings may arise from the fact that the manipulation and check utilised the same wording (i.e., both mention '[dis]similar' or the animal being a pet), rather than actual effectiveness of the manipulations. Whilst inclusion of alternative, validated subscales to measure effectiveness of the similarity manipulation (i.e., perceived shared emotional and cognitive traits with humans) overcomes this limitation to an extent, alternative scales to measure pet status have not yet been developed. Therefore, the pet status manipulation check used within this thesis may suffer from bias, rather than demonstrating true effectiveness of the manipulation in manipulating pet status. Additionally, although the manipulation checks for self-relevance and familiarity did not use the same wording as the manipulations, some of these manipulation checks again suffer from being oversimplified, single items developed by the researcher (e.g., '*How familiar do you perceive the species in the photograph to be to you?*' for familiarity), without these measures having prior validation. As such, due to lack of validation, these manipulation checks may not be truly measuring the underlying target construct (e.g., familiarity; Chester & Lasko, 2021). To overcome these limitations with the manipulation checks, future research should develop alternative, validated measures to check effectiveness of manipulations, such as scales which are developed and validated through factor analysis and use alternative wording to the manipulation, or implicit measures as a way to overcome self-report bias (e.g., like Cerrato & Forestell, 2022). Once alternative measures for the manipulation checks have been developed, the manipulations, especially those found to be effective at manipulating their intended variable here (i.e., similarity and pet status), can be re-tested for effectiveness with the new and validated manipulation check/s.

8.4. Overall Conclusions

The current project has a) consistently extended pet speciesism effects in the context of the SCM/BIAS map, whereby dogs are consistently viewed more positively than pigs, b) identified an overall positivity bias towards dogs, pigs and tree kangaroos, which is reduced for pigs and extreme for dogs, c) demonstrated some extension of the BIAS map from the SCM in line with previous SCM/BIAS map literature with animals, and d) explored extrinsic causes of pet speciesism using the SCM/BIAS map for the first time. Exploration of possible extrinsic causes of pet speciesism has demonstrated that a) similarity contributes to pet speciesism in warmth, competence, active help, and active harm, b) behavioural and subjective self-relevance surprisingly may not cause pet speciesism across any SCM/BIAS map dimensions, c) familiarity manipulations unexpectedly failed, and d) pet status informs unknown animals' warmth and, possibly, harm intentions towards unknown animals.

The project has limitations in scope due to a) the focus on dogs, pigs and unknown (mammalian) animals, b) exploration of extrinsic factors and not intrinsic factors, and c) possible culture-boundedness and questions regarding generalisability. Thus, to broaden the scope of current findings, future research should test the results with a wider range of matched-pair species (e.g., horses vs. cows) and non-mammals, explore the relative contributions of extrinsic and intrinsic factors to pet speciesism, and compare perceptions of animals and pet speciesism across cultures. The project also has methodological limitations regarding manipulations (i.e., sometimes ineffective manipulations, use of imagined scenarios) and manipulation checks (i.e., not always present, transparent wording). Thus, future research should overcome these methodological limitations by utilising real-world scenarios rather than imagined, presenting the similarity and pet status manipulations in an actual newspaper articles format, and utilising validated scales or implicit measures for manipulation checks.

Overall, this thesis is the first to systematically test extrinsic factors which inform pet speciesism. The project has extensive theoretical implications for anthrozoological and social psychological literature by testing applicability of the SCM/BIAS map to pet speciesism and exploring extrinsic causes of pet speciesism for the first time, highlighting the importance of similarity in informing perceptions of animals, and revealing limitations of other extrinsic causes (behavioural self-relevance, subjective self-relevance, familiarity). The project has novel practical implications by acting as the crucial foundation for future research to test interventions (e.g., using similarity) to reduce and/or prevent pet speciesism, thereby possibly decreasing meat consumption and its widespread negative impacts on pig welfare and the planet. Such interventions, if effective, will encourage desperately required advocacy for vulnerable animals, and aid in protecting life on Earth by reducing climate change and its devastating consequences.

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Appendices

Appendix 1. Study 1 Full Measures

a. Empathy Towards Animals Scale (Powell, 2010, adapted from Davis, 1983)

Empathic concern subscale:

1. I often have tender, concerned feelings for animals who suffer misfortune
2. Sometimes I don't feel very sorry for animals in need*
3. When I see an animal being taken advantage of, I feel kind of protective toward them
4. The misfortunes of animals do not usually disturb me a great deal*
5. When I see an animal being treated unfairly, I sometimes don't feel very much pity for them*
6. I am often quite touched by things I see happen to animals
7. I would describe myself as a pretty soft-hearted person

Perspective taking subscale:

8. Before scolding an animal, I try to imagine how I would feel if I were in their place
9. I sometimes try to understand by pets better by imagining how things look from their perspective
10. I sometimes find it difficult to see things from an animal's point of view*
11. When I'm upset at my pet, I usually try to "put myself in his shoes" for a while
12. When I see an animal in need, I imagine what my life would be like if I were an animal in the same situation

*This item is reverse-scored.

b. Animal Utility Scale (Kendall et al., 2006)

1. As long as animals do not suffer pain, humans should be able to use them for any purpose
2. It is acceptable to use animals to test consumer products such as soaps, cosmetics, and household cleaners
3. Hunting animals for sport is an acceptable form of recreation

c. Adapted Version of the Product Involvement Scale (Jain & Srinivasan, 1990; Kim, 2006; Luna & Kim, 2009)

1. I attach great importance to products made from pigs (e.g., pork, ham)
2. I am very interested in products made from pigs (e.g., pork, ham)
3. I am not indifferent to products made from pigs (e.g., pork, ham)*

*This third item was removed from the scale due to inadequate loading on the factor, inadequate communality, and inadequate inter-item correlations with the first two items.

Appendix 2. Principal Axis Factor Analyses

Principal axis factoring does not require multivariate normality (Floyd & Widaman, 1995; Gorsuch, 1983), and so normality was not tested for any PAFAs. Inter-item correlations, factor loadings, and communalities are discussed in the relevant sections in the main text, as these results informed whether items were retained in a scale or removed. Oblique direct oblimin rotations were implemented for all PAFAs to allow factors to correlate (although all PAFAs revealed only one factor for each scale, as assessed by eigenvalues ≥ one and through visual inspection of scree plots).

Assumptions specific to each PAFA are detailed below. General rules were applied for assumptions as follows: Firstly, recommended sample sizes for factor analysis are highly variable (see Field et al., 2012; Mundfrom et al., 2005), with some recommending absolute sample sizes (e.g., at least 200), and others recommending sample sizes dependent on the number of items in the scale (e.g., 20 participants per item; Mundfrom et al., 2005). The PAFAs in the current study revealed some communality values on the lower end of the scale, as well as scales having relatively small item to factor ratios (e.g., mostly 3:1 or 4:1, except for the active harm subscale at 5:1, as all scales have one factor only, and scales range from three to five items). Whilst an exact minimum sample size cannot be calculated, the sample sizes of the current studies (*N*s=128 to 215) may be inadequate, as factor analyses with lower communalities and lower item to factor ratios require larger sample sizes (Mundfrom et al., 2005). I therefore proceeded with the PAFAs, but results may need to be interpreted with caution due to possibly inadequate sample sizes, especially for the PAFA on the pre-manipulation active help subscale in Study 6 (*N*=128).

Secondly, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for all PAFAs should ideally be > .8, although > .6 can still be considered acceptable (Backhaus et al., 2016), whilst Bartlett’s test of sphericity should be significant for all PAFAs (Bartlett, 1951).

These assumptions ensure there is enough common variance among items for factor analysis to be appropriate.

a. Study 1 Animal Utility Scale

Both the KMO (.61) and Bartlett's test of sphericity, $\chi^2(3) = 74.57$, $p < .001$, were adequate, suggesting that factor analysis is appropriate for this scale. One factor was extracted, which explained 56.43% of total variance.

b. Study 1 Adapted Product Involvement Scale to Test Subjective Self-Relevance of Pigs

Whilst Bartlett's test of sphericity, $\chi^2(3) = 193.05$, $p < .001$, was adequate, KMO was inadequate (.56), suggesting that factor analysis is inappropriate for this scale. This lack of common variance is reflected in the extremely low communality value of the third item (alongside the third item's inadequate factor loading and correlations with the other two variables), hence the third item was removed from the scale.

c. Study 3 Adapted Warmth Subscale

Both the KMO (pre-manipulation: .72; post-manipulation .73) and Bartlett's test of sphericity, pre-manipulation $\chi^2(3) = 243.58$, post-manipulation $\chi^2(3) = 357.91$, *p*s < .001, were adequate at both timepoints, suggesting that factor analysis is appropriate for this scale. One factor was extracted at both timepoints, which explained 74.81% (pre-manipulation) and 80.8% (post-manipulation) of total variance.

d. Study 3 Adapted Competence Subscale

Both the KMO (pre-manipulation: .73; post-manipulation .76) and Bartlett's test of sphericity, pre-manipulation $\chi^2(3) = 355.37$, post-manipulation $\chi^2(3) = 528.03$, *p*s < .001, were adequate at both timepoints, suggesting that factor analysis is appropriate for this scale.

One factor was extracted at both timepoints, which explained 81.17% (pre-manipulation) and 88.02% (post-manipulation) of total variance.

e. Study 3 Adapted Active Help Subscale

Both the KMO (pre-manipulation: .81; post-manipulation .81) and Bartlett's test of sphericity, pre-manipulation $\chi^2(6) = 333.65$, post-manipulation $\chi^2(6) = 517.62$, *p*s < .001, were adequate at both timepoints, suggesting that factor analysis is appropriate for this scale. One factor was extracted at both timepoints, which explained 67.93% (pre-manipulation) and 75.6% (post-manipulation) of total variance.

f. Study 3 Adapted Active Harm Subscale

Both the KMO (pre-manipulation: .83; post-manipulation .82) and Bartlett's test of sphericity, pre-manipulation $\chi^2(10) = 338.66$, post-manipulation $\chi^2(10) = 404.69$, *p*s < .001, were adequate at both timepoints, suggesting that factor analysis is appropriate for this scale. One factor was extracted at both timepoints, which explained 57.01% (pre-manipulation) and 59.92% (post-manipulation) of total variance.

g. Study 4 Cognitive Capacities Subscale

Both the KMO (.64) and Bartlett's test of sphericity, $\chi^2(6) = 49.57$, $p < .001$, were adequate, suggesting that factor analysis is appropriate for this scale. One factor was extracted, which explained 47.79% of total variance.

h. Study 6 Pre-Manipulation Active Help Subscale

Both the KMO (.73) and Bartlett's test of sphericity, $\chi^2(6) = 74.83$, $p < .001$, were adequate, suggesting that factor analysis is appropriate for this scale. One factor was extracted, which explained 51.37% of total variance.

Appendix 3. Study 1 Participant Advertisements

a. Sona

Study Name: The effect of different characteristics on perceptions of animals

Description: I am conducting this 15 min study to examine possible factors explaining our preferences for different animals. You will be given a participant information sheet describing the study and then be asked to provide informed consent. You will then complete scales measuring perceptions of animals and pig products. A debrief and researchers' contact details will follow.

Eligibility: You must be 18 years of age or over due to ability to give informed consent.

Duration: 15 minutes

Credits: 0.25 credits

Researcher: Sarah Gradidge, sarah.gradidge@pgr.anglia.ac.uk

This study has received ethics approval by the Psychology School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of Anglia Ruskin University's Policy and Code of Practice for the Conduct of Research with Human Participants.

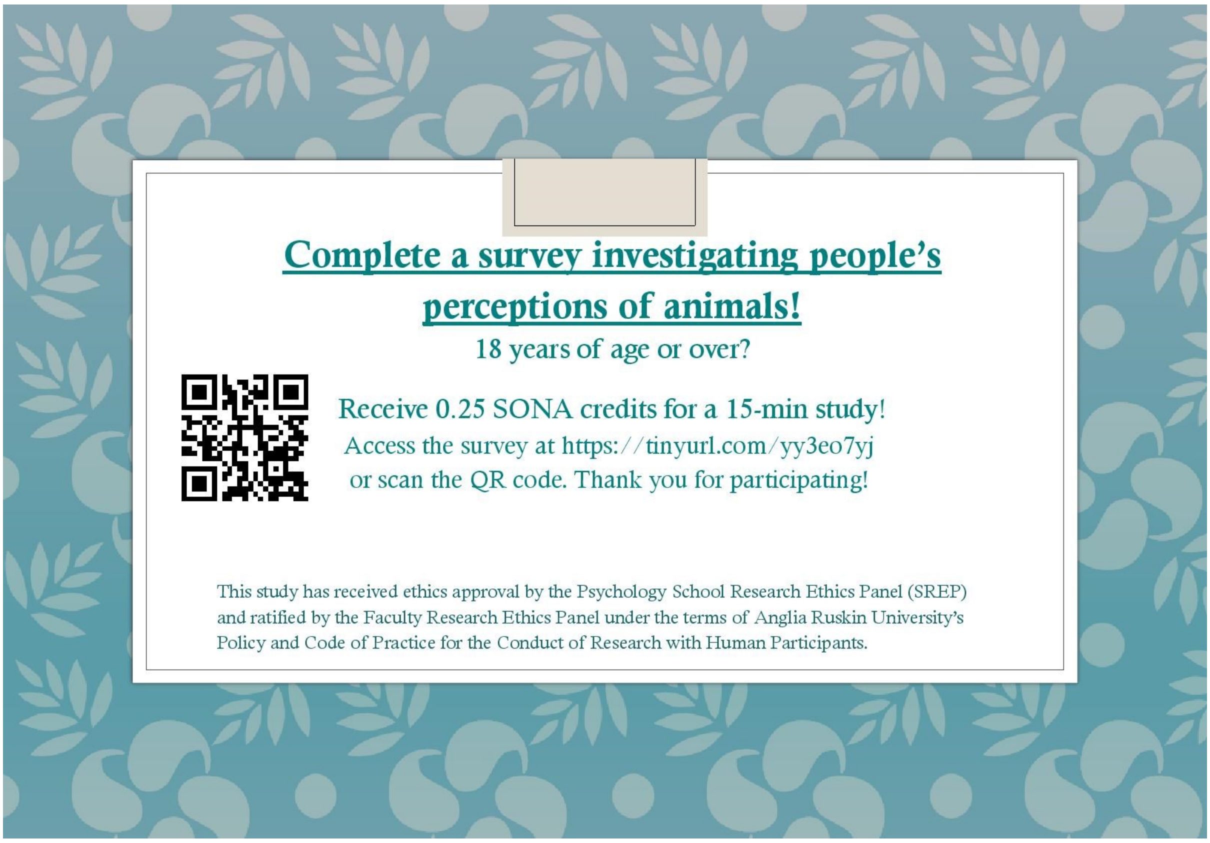
b. Social Media

Got 15 minutes and over 18? Want 0.25 SONA credits? Participate in my online survey on animal perception. More details under the link below. Thanks for participating and please share with others!

Qualtrics link here

This study has received ethics approval by the Psychology School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of Anglia Ruskin University's Policy and Code of Practice for the Conduct of Research with Human Participants.

c. Poster



Complete a survey investigating people's perceptions of animals!

18 years of age or over?

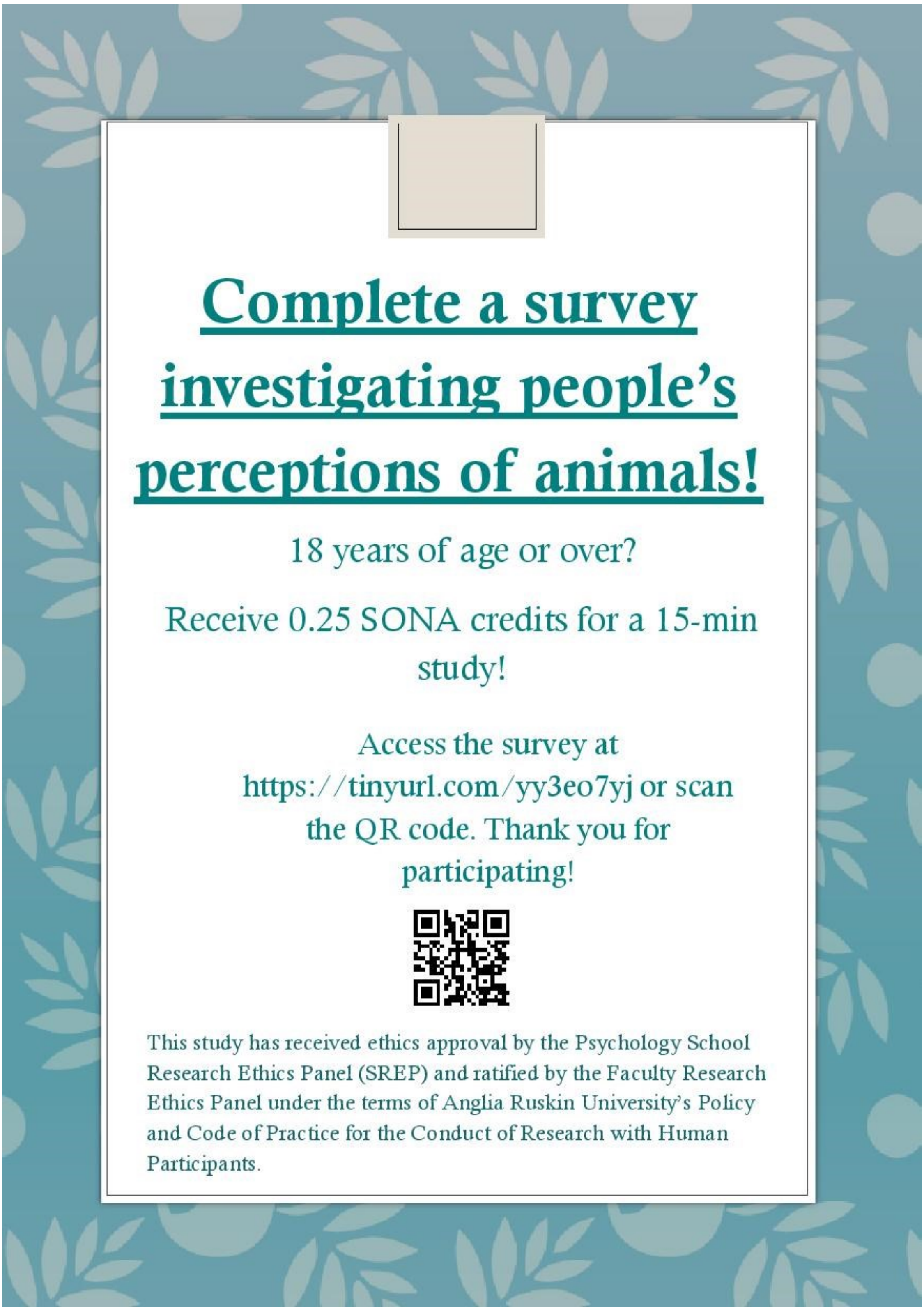
Receive 0.25 SONA credits for a 15-min study!

Access the survey at https://tinyurl.com/yy3eo7yj

or scan the QR code. Thank you for participating!

This study has received ethics approval by the Psychology School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of Anglia Ruskin University's Policy and Code of Practice for the Conduct of Research with Human Participants.

d. Flyer



Complete a survey investigating people's perceptions of animals!

18 years of age or over?

Receive 0.25 SONA credits for a 15-min study!

Access the survey at https://tinyurl.com/yy3eo7yj or scan the QR code. Thank you for participating!

This study has received ethics approval by the Psychology School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of Anglia Ruskin University's Policy and Code of Practice for the Conduct of Research with Human Participants.

Appendix 4. Statistics Tables

Table A1

Inferential Statistics for Study 1 Multiple Regressions on Dog Warmth, Dog Competence, Pig Warmth, and Pig Competence

Regressor	*B*	*SE*	*F*	η_p^2	Adj. R^2
(OV1) Dog Warmth			12.45***		.45
Pigs' Behavioural Self-Relevance	.18	.09	4.08*	.02	
Pigs' Subjective Self-Relevance	-.03	.09	.11	.001	
Dog Familiarity	.56	.15	14.77***	.07	
Pig Familiarity	-.18	.13	1.76	.01	
Dog Similarity	.43	.13	10.17**	.05	
Pig Similarity	-.2	.15	1.85	.01	
Dog Pet Status	.72	.19	14***	.07	
Pig Pet Status	.47	.12	16.66***	.08	
Dog Profit Status	-.39	.12	11.59***	.06	
Pig Profit Status	.05	.09	.27	.001	
Empathic Concern Towards Animals	.12	.03	12.04***	.06	
Perspective Taking of Animals	.03	.03	1.12	.01	
Support for Animal Utility	-.05	.04	1.16	.01	
(Covariate) Diet	.34	.31	1.22	.01	
(Covariate) Gender	.24	.32	.57	.003	
(OV2) Dog Competence			6.38***		.28
Pigs' Behavioural Self-Relevance	.07	.11	.39	.002	
Pigs' Subjective Self-Relevance	.04	.11	.11	.001	
Dog Familiarity	-.05	.18	.06	<.001	
Pig Familiarity	-.04	.17	.05	<.001	
Dog Similarity	.38	.17	5.23*	.03	

Pig Similarity	-.16	.18	.79	.004	
Dog Pet Status	.66	.24	7.81**	.04	
Pig Pet Status	.52	.14	13.6***	.07	
Dog Profit Status	-.14	.14	.95	.01	
Pig Profit Status	-.17	.12	2.12	.01	
Empathic Concern Towards Animals	.13	.04	9.73**	.05	
Perspective Taking of Animals	.07	.04	3.96*	.02	
Support for Animal Utility	-.05	.05	.87	.004	
(Covariate) Diet	.6	.38	2.48	.01	
(Covariate) Gender	.08	.39	.04	<.001	
(OV3) Pig Warmth			8.3***		.34
Pigs’ Behavioural Self-Relevance	.36	.13	7.15**	.04	
Pigs’ Subjective Self-Relevance	-.31	.14	5.08*	.03	
Dog Familiarity	.25	.22	1.35	.01	
Pig Familiarity	.21	.2	1.07	.01	
Dog Similarity	-.22	.2	1.16	.01	
Pig Similarity	.5	.22	5.12*	.03	
Dog Pet Status	.84	.29	8.56**	.04	
Pig Pet Status	.64	.17	13.69***	.07	
Dog Profit Status	.11	.17	.39	.002	
Pig Profit Status	-.15	.14	1.18	.01	
Empathic Concern Towards Animals	.14	.05	7.69**	.04	
Perspective Taking of Animals	-.01	.05	.04	<.001	
Support for Animal Utility	-.1	.07	2.41	.01	
(Covariate) Diet	.16	.46	.12	.001	
(Covariate) Gender	.67	.47	1.99	.01	

(OV4) Pig Competence			8.41***		.35
Pigs’ Behavioural Self-Relevance	.01	.14	.48	.002	
Pigs’ Subjective Self-Relevance	-.27	.15	3.48	.02	
Dog Familiarity	-.16	.23	.46	.002	
Pig Familiarity	.56	.21	7.04**	.04	
Dog Similarity	-.16	.21	.6	.003	
Pig Similarity	.79	.23	11.95***	.06	
Dog Pet Status	.94	.3	9.74**	.05	
Pig Pet Status	.52	.18	8.28**	.04	
Dog Profit Status	-.004	.18	<.001	<.001	
Pig Profit Status	-.01	.15	.003	<.001	
Empathic Concern Towards Animals	.08	.05	2.52	.01	
Perspective Taking of Animals	.03	.05	.37	.002	
Support for Animal Utility	-.06	.07	.66	.003	
(Covariate) Diet	.6	.48	1.55	.01	
(Covariate) Gender	.29	.5	.33	.002	

Note. *p<.05, **p≤.01, ***p≤.001. OV refers to outcome variable.

Table A2

Inferential Statistics for Study 2 2x2x2 MANCOVA on SCM/BIAS Map Variables

DV	*F*	η_p^2
(IVs) Behavioural Self-Relevance x Subjective Self-Relevance x Time Interaction	1.92	.05
(IV) Behavioural Self-Relevance x Time Interaction	.76	.02
(IV) Subjective Self-Relevance x Time Interaction	1.08	.03
(Covariate) Diet x Time Interaction	.42	.01
(Covariate) Gender x Time Interaction	1.25	.03

(IVs) Behavioural Self-Relevance x Subjective Self-Relevance Interaction	1.9	.05
(IV) Behavioural Self-Relevance Main Effect	1.33	.04
(IV) Subjective Self-Relevance Main Effect	.59	.02
(Covariate) Diet Main Effect	2.36*	.06
Warmth	1.31	.01
Competence	5.16*	.02
Active Help	7.75**	.03
Passive Help	9.99**	.04
Active Harm	.15	.001
Passive Harm	.29	.001
(Covariate) Gender Main Effect	3.31**	.08
Warmth	1.48	.01
Competence	6.55*	.03
Active Help	.06	<.001
Passive Help	.63	.003
Active Harm	8.91**	.04
Passive Harm	3.61	.02
Time Main Effect	2.71*	.07
Warmth	9.91**	.04
Competence	.56	.003
Active Help	5.43**	.02
Passive Help	2.66	.01
Active Harm	.78	.004
Passive Harm	4.07*	.02

Note. *$p<.05$, **$p\leq.01$, ***$p\leq.001$. Multivariate effects from the MANCOVA are reported in *italics,* with univariate effects on individual DVs from the follow-up ANCOVAs being reported after significant multivariate effects only. IV = independent variable

Table A3

Inferential Statistics for Study 2 2x2 MANCOVA on Reported Weekly Meat Consumption, Post-Manipulation Dissonance and Post-Evaluation Dissonance

DV	*F*	η_p^2
(IVs) Behavioural Self-Relevance x Subjective Self-Relevance Interaction	1.04	.01
(IV) Behavioural Self-Relevance Main Effect	4.47**	.06
Reported Weekly Meat Consumption	.3	.001
Post-Manipulation Dissonance	12.51***	.05
Post-Evaluation Dissonance	.78	.004
(IV) Subjective Self-Relevance Main Effect	5.29**	.07
Reported Weekly Meat Consumption	1.21	.01
Post-Manipulation Dissonance	9.01**	.04
Post-Evaluation Dissonance	.83	.004
(Covariate) Diet Main Effect	88.16***	.55
Reported Weekly Meat Consumption	257.58***	.54
Post-Manipulation Dissonance	10.73***	.05
Post-Evaluation Dissonance	.67	.003
(Covariate) Gender Main Effect	2.91*	.04
Reported Weekly Meat Consumption	3.59	.02
Post-Manipulation Dissonance	5.29*	.02
Post-Evaluation Dissonance	.39	.002

Note. *p<.05, **$p \leq$.01, ***$p \leq$.001. Multivariate effects from the MANCOVA are reported in *italics,* with univariate effects on individual DVs from the follow-up ANCOVAs being reported after significant multivariate effects only. IV = independent variable

Table A4

Inferential Statistics for Study 3 3x2 ANCOVA for Subjective Self-Relevance Manipulation Check

Effect	F	η_p^2
(IVs) Subjective Self-Relevance x Species Interaction	1.48	.01
(IV) Subjective Self-Relevance Main Effect	261.89***	.56
(IV) Species Main Effect	.14	.001
(Covariate) Neutrality	.62	.003
(Covariate) Gender	2.35	.01

Note. *$p<.05$, **$p\leq.01$, ***$p\leq.001$. IV = independent variable

Table A5

Inferential Statistics for Study 3 3x2x2 MANCOVA on SCM/BIAS Map Variables, Reported Weekly Meat Consumption, Discomfort, and Behavioural Self-Relevance

DV	F	η_p^2
(IVs) Behavioural Self-Relevance/Time x Subjective Self-Relevance x Species Interaction	1.03	.04
(IVs) Behavioural Self-Relevance/Time x Subjective Self-Relevance Interaction	1.97*	.08
Warmth	1.95	.01
Competence	1.59	.01
Active Help	2.83	.01
Passive Help	.78	.004
Active Harm	.46	.002
Passive Harm	.01	<.001
Reported Weekly Meat Consumption	.004	<.001
Discomfort	.81	.004
Measured Behavioural Self-Relevance	12.17***	.06
(IVs) Behavioural Self-Relevance/Time x Species Interaction	4.76***	.18
Warmth	.13	.001

Competence	.22	.002
Active Help	2.1	.02
Passive Help	.95	.01
Active Harm	.26	.003
Passive Harm	1.44	.01
Reported Weekly Meat Consumption	.03	<.001
Discomfort	38.28***	.27
Measured Behavioural Self-Relevance	3.54*	.03
(IVs) Species x Subjective Self-Relevance Interaction	1.29	.06
(IV/Covariate) Behavioural Self-Relevance/Time x Neutrality Interaction	1.01	.04
(IV/Covariate) Behavioural Self-Relevance/Time x Gender Interaction	2.45*	.1
Warmth	1.08	.01
Competence	.03	<.001
Active Help	.002	<.001
Passive Help	.73	.003
Active Harm	3.9	.02
Passive Harm	3.97*	.02
Reported Weekly Meat Consumption	.22	.001
Discomfort	13.66***	.06
Measured Behavioural Self-Relevance	3.44	.02
(IV) Behavioural Self-Relevance/Time Main Effect	6.05***	.22
Warmth	.34	.002
Competence	.42	.002
Active Help	.06	<.001
Passive Help	.71	.003
Active Harm	.14	.001

Passive Harm	5.16*	.02
Reported Weekly Meat Consumption	2.17	.01
Discomfort	46.09***	.18
Measured Behavioural Self-Relevance	4.85*	.02
(IV) Subjective Self-Relevance Main Effect	1.11	.05
(IV) Species Main Effect	13.14***	.37
Warmth	34***	.25
Competence	27.54***	.21
Active Help	19.48***	.16
Passive Help	7.11***	.06
Active Harm	31.12***	.23
Passive Harm	25.46***	.2
Reported Weekly Meat Consumption	1.64	.02
Discomfort	16.74***	.14
Measured Behavioural Self-Relevance	134.66***	.57
(Covariate) Neutrality Main Effect	1.52	.06
(Covariate) Gender Main Effect	2.96**	.12
Warmth	2.58	.01
Competence	8.98**	.04
Active Help	3.71	.02
Passive Help	2.94	.01
Active Harm	.99	.01
Passive Harm	3.91*	.02
Reported Weekly Meat Consumption	.22	.001
Discomfort	19.6***	.09
Measured Behavioural Self-Relevance	1.26	.01

Note. **p*<.05, ***p*≤.01, ****p*≤.001. Multivariate effects from the MANCOVA are reported in *italics,* with univariate effects on individual DVs from the follow-up ANCOVAs being reported after significant multivariate effects only. IV = independent variable

Table A6

Inferential Statistics for Study 4 One-Way ANCOVA for Familiarity Manipulation Check

Effect	*F*	η_p^2
(IV) Familiarity Main Effect	1.14	.01
(Covariate) Neutrality	6.63*	.07
(Covariate) Gender	.83	.01

Note. *$p<.05$, **$p\leq.01$, ***$p\leq.001$. IV = independent variable

Table A7

Inferential Statistics for Study 4 One-Way MANCOVA for Similarity Manipulation Checks

DV	*F*	η_p^2
(IV) Similarity Main Effect	9.17***	.23
Perceived Similarity to Humans	19.46***	.17
Perceived Shared Emotional Capacities with Humans	11.2***	.11
Perceived Shared Cognitive Capacities with Humans	13.66***	.13
(Covariate) Neutrality	3.45*	.1
Perceived Similarity to Humans	7.95**	.08
Perceived Shared Emotional Capacities with Humans	.35	.004
Perceived Shared Cognitive Capacities with Humans	.24	.003
(Covariate) Gender	1.18	.04

Note. *$p<.05$, **$p\leq.01$, ***$p\leq.001$. Multivariate effects from the MANCOVA are reported in *italics,* with univariate effects on individual DVs from the follow-up ANCOVAs being reported after significant multivariate effects only. IV = independent variable

Table A8

Inferential Statistics for Study 4 4x2 MANCOVA on SCM/BIAS Map Variables

DV	*F*	η_p^2
(IV) Condition x Time Interaction	3.16***	.09
Warmth	4.04**	.06
Competence	15.09***	.19
Active Help	5.15**	.07
Passive Help	4.38**	.06
Active Harm	.11	.002
Passive Harm	1.25	.02
(Covariate) Neutrality x Time Interaction	.61	.02
(Covariate) Gender x Time Interaction	.43	.01
(IV) Condition Main Effect	1.71*	.05
Warmth	2.57	.04
Competence	2.52	.04
Active Help	2.27	.03
Passive Help	.31	.01
Active Harm	1.54	.02
Passive Harm	1.26	.02
Time Main Effect	.86	.03
(Covariate) Neutrality	1.71	.05
(Covariate) Gender	1.52	.05

Note. **p*<.05, ***p*≤.01, ****p*≤.001. Multivariate effects from the MANCOVA are reported in *italics,* with univariate effects on individual DVs from the follow-up ANCOVAs being reported after significant multivariate effects only. IV = independent variable

Table A9

Inferential Statistics for Study 5 2x2x2 MANCOVA on SCM/BIAS Map Variables and Similarity Manipulation Checks

DV	*F*	η_p^2
(IVs) Similarity x Species x Time Interaction	1.66	.08
(IV) Similarity x Time Interaction	5.71***	.24
Warmth	8.02**	.04
Competence	23.41***	.12
Active Help	4.98*	.03
Passive Help	3.03	.02
Active Harm	7.81**	.04
Passive Harm	.02	<.001
Perceived Similarity to Humans	17.33***	.09
Perceived Shared Emotional Traits with Humans	29.75***	.15
Perceived Shared Cognitive Traits with Humans	40.27***	.19
(IV) Species x Time Interaction	1.03	.05
(IVs) Similarity x Species Interaction	.64	.03
(Covariate) Neutrality x Time Interaction	.53	.03
(Covariate) Gender x Time Interaction	.5	.03
(IV) Similarity Main Effect	2.84**	.13
Warmth	11.72***	.06
Competence	4.39*	.03
Active Help	7.64**	.04
Passive Help	.25	.001
Active Harm	3.73	.02
Passive Harm	2.23	.01
Perceived Similarity to Humans	2.01	.01

Perceived Shared Emotional Traits with Humans	13.26***	.07
Perceived Shared Cognitive Traits with Humans	1.48	.01
(IV) Species Main Effect	15.22***	.45
Warmth	72.84***	.3
Competence	90.12***	.34
Active Help	55.63***	.24
Passive Help	25.59***	.13
Active Harm	77.33***	31
Passive Harm	47.21***	.21
Perceived Similarity to Humans	6.49*	.04
Perceived Shared Emotional Traits with Humans	45.36***	.21
Perceived Shared Cognitive Traits with Humans	31.68***	.15
Time Main Effect	.54	.03
(Covariate) Neutrality	.5	.03
(Covariate) Gender	1.13	.06

Note. **p*<.05, ***p*≤.01, ****p*≤.001. Multivariate effects from the MANCOVA are reported in *italics,* with univariate effects on individual DVs from the follow-up ANCOVAs being reported after significant multivariate effects only. IV = independent variable

Table A10

Inferential Statistics for Study 6 One-Way ANCOVA for Pet Status Manipulation Check

Effect	*F*	η_p^2
(IV) Pet Status Main Effect	5.06*	.04
(Covariate) Neutrality	6.28*	.05
(Covariate) Gender	1.68	.01

Note. **p*<.05, ***p*≤.01, ****p*≤.001. IV = independent variable

Table A11

Inferential Statistics for Study 6 2x2 MANCOVA on SCM/BIAS Map Variables

DV	*F*	η_p^2
(IV) Pet Status x Time Interaction	2.46*	.11
Warmth	10.03**	.08
Competence	1	.01
Active Help	2.69	.02
Passive Help	1.39	.01
Active Harm	4.89*	.04
Passive Harm	4.43*	.03
(Covariate) Neutrality x Time Interaction	1.97	.09
(Covariate) Gender x Time Interaction	.64	.03
(IV) Pet Status Main Effect	1.18	.06
Time Main Effect	1.72	.08
(Covariate) Neutrality Main Effect	2.6*	.12
Warmth	7.09**	.05
Competence	5.07*	.04
Active Help	1.97	.02
Passive Help	7.08**	.05
Active Harm	.49	.004
Passive Harm	.17	.001
(Covariate) Gender Main Effect	.34	.02

Note. *$p<.05$, **$p\leq.01$, ***$p\leq.001$. Multivariate effects from the MANCOVA are reported in *italics,* with univariate effects on individual DVs from the follow-up ANCOVAs being reported after significant multivariate effects only. IV = independent variable

Appendix 5. Study 2 Participant Advertisements

a. Sona

Study Name: Perceptions of animals

Description: I am conducting this 15-minute experiment to examine possible factors explaining our perceptions of, and behavioural intentions towards, different animals. You will be given a participant information sheet describing the experiment and then be asked to provide informed consent. You will then be introduced to an animal and asked to indicate your perceptions of and behavioural intentions towards it. A debrief and researchers' contact details will follow. Participants will have the opportunity to enter a prize draw at the end of survey to win one of two £50 Amazon gift vouchers.

Eligibility: You must be 18 years of age or over due to ability to give informed consent.

Duration: 15 minutes

Credits: 0.25 credits

Researcher: Sarah Gradidge, sarah.gradidge@pgr.anglia.ac.uk

The study has received ethics approval by the School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of Anglia Ruskin University's Policy and Code of Practice for the Conduct of Research with Human Participants.

b. Social Media

Got 15 minutes and over 18? Participate in my second online survey on perceptions of animals. Participants will have the opportunity to enter a prize draw at the end of survey to win one of two £50 Amazon gift vouchers. If you are an ARU undergraduate psychology student, you can also receive 0.25 SONA credits. More details under the link below. Please share with others!

Qualtrics link here

The study has received ethics approval by the School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of Anglia Ruskin University's Policy and Code of Practice for the Conduct of Research with Human Participants.

c. Poster

Complete a 15 minute online experiment investigating people's perceptions of animals and be in with a chance to win an Amazon gift voucher!

Access the experiment at https://tinyurl.com/y79su8wb or scan the QR code.

The study has received ethics approval by the School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of Anglia Ruskin University's Policy and Code of Practice for the Conduct of Research with Human Participants

d. Flyer

Complete a 15 minute online experiment investigating people's perceptions of animals and be in with a chance to win an Amazon gift voucher!

Access the experiment at https://tinyurl.com/y79su8wb or scan the QR code.

The study has received ethics approval by the School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of Anglia Ruskin University's Policy and Code of Practice for the Conduct of Research with Human Participants

Appendix 6. Images for Self-Relevance Manipulation

The below images were used to accompany the text introducing the imagined restaurant scenario, as a way to enhance realism.

Image courtesy of peoplecreations on Freepik. Designed by Freepik.

<a href="https://www.freepik.com/photos/business"> Business photo created by peoplecreations

OTHER ITEMS

Home-style Lasagna.............................. 14.29

(Served with Garlic Bread & Tossed Salad)

Chili with Garlic Bread or Roll

Fries

Fries, Dressing & Gravy

Poutine

Day & Ross

Day & Ross Poutine

Image courtesy of Erik Mclean on Unsplash. Available at https://unsplash.com/photos/8yWLSPvoeVI

Appendix 7. Study 3 Prolific Participant Advertisement

Title of study: Perceptions of animals

Describe what participants will be doing in this study: This experiment aims to examine your perceptions of an animal. You will be asked how you feel about an animal, followed by reading an imagined scenario about being in a restaurant. After the imagined scenario, you will again indicate how you feel about the animal. You may also provide demographic information as follows: diet, gender, age, nationality, ethnicity, current country of residence, duration of living in current country of residence and religion. Note that partial data will be reimbursed depending on percentage of completion whilst adhering to Prolific's minimum hourly rate. If you provide partial data, you will be asked by the researcher to return your submission and you will receive payment via the Bonus Payments system. Also note that some participants may be asked if they recognise an animal: Those who say that they do recognise the animal will be excluded from the rest of the experiment, asked to return their submission and reimbursed for their time in completing the experiment.

The study has received ethics approval by the School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of Anglia Ruskin University's Policy and Code of Practice for the Conduct of Research with Human Participants.

Pre-screening:

- Participants age 18+
- Meat consumers only

Appendix 8. Study 4 Participant Advertisements

a. Sona

Study Name: Perceptions of animals 3

Description: This 15-minute experiment aims to examine your perceptions of an unrecognised animal. Firstly, you will read a participant information sheet and provide informed consent. You will then be asked if you recognise an animal and how you feel about the animal, followed by reading some texts about the animal. After the texts, you will again indicate how you feel about the animal, followed by a debrief and researchers' contact details. You will receive either 0.25 SONA credits or be able to enter a prize draw for one of two £50 Amazon gift vouchers instead.

Eligibility: You must be 18 years of age or over due to ability to give informed consent. You must not have completed any of the previous "Perceptions of animals" experiments

Duration: 15 minutes

Credits: 0.25 credits or entering the prize draw

Researcher: Sarah Gradidge, sarah.gradidge@pgr.aru.ac.uk

The study has received ethics approval by the School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of ARU's Policy and Code of Practice for the Conduct of Research with Human Participants.

b. Social Media

Got up to 15 minutes, over 18 and have not participated in any previous 'perceptions of animals' experiments? Participate in my fourth online survey on perceptions of animals. All participants can enter a prize draw to win one of two £50 Amazon gift vouchers. If you are an

ARU undergraduate psychology student, you can receive 0.25 SONA credits instead. More details under the link below. Please share with others!

Qualtrics link here

The study has received ethics approval by the School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of ARU’s Policy and Code of Practice for the Conduct of Research with Human Participants.

Appendix 9. Study 5 Prolific Participant Advertisement

Title of study: Perceptions of animals

Describe what participants will be doing in this study: This experiment aims to examine your perceptions of an animal. You will be asked how you feel about an animal, followed by reading some text about the animal. After reading the text, you will again indicate how you feel about the animal. You may also provide demographic information as follows: diet, gender, age, nationality, ethnicity, current country of residence, duration of living in current country of residence and religion. Note that partial data will be reimbursed depending on percentage of completion whilst adhering to Prolific's minimum hourly rate. If you provide partial data, you will be asked by the researcher to return your submission and you will receive payment via the Bonus Payments system.

The study has received ethics approval by the School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of Anglia Ruskin University's Policy and Code of Practice for the Conduct of Research with Human Participants.

Pre-screening:

- Participants age 18+
- Meat consumers only

Appendix 10. Study 6 Participant Advertisements

a. Sona

Study Name: Perceptions of animals 4

Description: This 15-minute experiment aims to examine your perceptions of an unrecognised animal. Firstly, you will read a participant information sheet and provide informed consent. You will then be asked if you recognise an animal and how you feel about the animal, followed by reading some texts about the animal. After the texts, you will again indicate how you feel about the animal, followed by a debrief and researchers' contact details. You will receive either 0.25 SONA credits or be able to enter a prize draw for one of two £50 Amazon gift vouchers instead.

Eligibility: You must be 18 years of age or over due to ability to give informed consent. You must not have completed any of the previous "Perceptions of animals" experiments

Duration: 15 minutes

Credits: 0.25 credits or entering the prize draw

Researcher: Sarah Gradidge, sarah.gradidge@pgr.aru.ac.uk

The study has received ethics approval by the School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of ARU's Policy and Code of Practice for the Conduct of Research with Human Participants.

b. Social Media

Got up to 15 minutes, over 18 and have not participated in any previous 'perceptions of animals' experiments? Participate in my fifth online survey on perceptions of animals. All participants can enter a prize draw to win one of two £50 Amazon gift vouchers. If you are an

ARU undergraduate psychology student, you can receive 0.25 SONA credits instead. More details under the link below. Please share with others!

Qualtrics link here

The study has received ethics approval by the School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of ARU's Policy and Code of Practice for the Conduct of Research with Human Participants.

c. Prolific

Title of study: Perceptions of animals

Describe what participants will be doing in this study: This experiment aims to examine your perceptions of an animal. You will be asked how you feel about an animal, followed by reading an imagined scenario about being in a restaurant. After the imagined scenario, you will again indicate how you feel about the animal. You may also provide demographic information as follows: diet, gender, age, nationality, ethnicity, current country of residence, duration of living in current country of residence and religion. Note that partial data will be reimbursed depending on percentage of completion whilst adhering to Prolific's minimum hourly rate. If you provide partial data, you will be asked by the researcher to return your submission and you will receive payment via the Bonus Payments system. Also note that some participants may be asked if they recognise an animal: Those who say that they do recognise the animal will be excluded from the rest of the experiment, asked to return their submission and reimbursed for their time in completing the experiment.

The study has received ethics approval by the School Research Ethics Panel (SREP) and ratified by the Faculty Research Ethics Panel under the terms of Anglia Ruskin University's Policy and Code of Practice for the Conduct of Research with Human Participants.

Pre-screening:

- Participants age 18+
- Meat consumers only