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Age-related differences in reasoning about the acceptability of eating animals

Luke McGuire[1] | **Emma Fry**[1] | **Sally Palmer**[2] | **Nadira S. Faber**[1,3]

[1]College of Life and Environmental Sciences, University of Exeter, Exeter, UK

[2]Graduate School of Education, University of Exeter, Exeter, UK

[3]Oxford Uehiro Centre for Practical Ethics, University of Oxford, Oxford, UK

Correspondence
Luke McGuire, Washington Singer Building, Perry Road, Exeter, EX4 4QG, UK.
Email: l.mcguire@exeter.ac.uk

Abstract

Children in the western world often are socialized as meat-eaters, while caring much about animals. Yet we know little about how children think about eating animals and animal products, which will have important consequences for global meat consumption. Participants ($n = 479$, 80% White British, 57% female; children $n = 119$, Mage = 10.03, SD = 0.72; young adults $n = 181$, Mage = 19.09, SD = 0.85; adults $n = 179$, Mage = 40.97, SD = 8.18) reasoned about the acceptability of eating animals and animal products. Using the framework of social domain theory, we found that that children focused on moral concerns ($p < .001$, $\eta p2 = .01$), whereas adults referenced conventions about the natural and necessary components of eating meat. Participants across age groups reported eating animal products (e.g., milk) to be acceptable because animals were not harmed. Together these results indicate that attempts to reduce meat consumption ought to be tailored in a domain-specific manner to age groups.

KEYWORDS
human-animal relations, reasoning, meat consumption

1 | INTRODUCTION

Humans' relationships with non-human animals largely are informed by the fact that we have reared and eaten certain animals for thousands of years (Otter, 2018), whereas at the same time, lived alongside others as beloved household

companions. How humans think about animals can illustrate a moral conflict to the individual who loves some animals, while endorsing harm against others through eating them. This "meat paradox" (i.e., the conflict that arises between desiring not to cause harm to animals, while at the same time eating a diet that includes meat; Bastian & Loughnan, 2017; Buttlar & Walther, 2018; Loughnan et al., 2014) has been studied in adulthood. A rich body of evidence has demonstrated that adults use motivated cognition practices, including self-serving reasoning and justification, to overcome this cognitive conflict. So far, little is known about how these issues are judged and reasoned about in childhood. This topic is important as scholars in this area have argued that we are *taught* the justifications that uphold meat-eating practices (e.g., Joy, 2011). Despite such claims, there has yet to be a systematic examination of reasoning and justification around meat-eating in childhood (for an exception examining independent vegetarian children see Hussar & Harris, 2010) and how this compares to adults' reasoning. The current study offers a comparison of children's (9–11-years-old), young adults' (18–21-years-old) and adults' (29–59-years-old) evaluation of the acceptability of eating animals and their products, as well as, for the first time, a comparison of age-related differences in the *reasoning* provided to justify these evaluations.

1.1 | Theoretical framework

Social Domain Theory (SDT; Turiel, 1983, 2015) offers a valuable theoretical framework for considering the ways in which children (and adults) may weigh up whether to eat animals and their products. SDT argues that humans largely distinguish between issues in three domains; the moral domain (issues regarding welfare, harm, fairness, and justice), the social-conventional domain (issues regarding social norms, customs, conventions), and the personal domain (issues related to the minds of self and others, such as privacy and autonomy). In the case of eating animals, all three domains may be relevant. Indeed, independent vegetarian children have been shown to recognise that eating meat does involve personal autonomy (Hussar & Harris, 2010). However, in the present work we examine whether the moral and the social-conventional domains may be *particularly* important to omnivorous children and adults, as they underlie the meat paradox (i.e., the conflict between moral principles of harm aversion, meat-eating and factual knowledge of how societies treat animals). Hence, in the present work, we focus on the potential conflict between moral domain and social-conventional domain reasoning.

Work with adults has focused on the so-called 4 N's of meat-eating justification; with adults arguing that eating meat is *natural* (e.g., we are evolutionarily designed to eat meat), *normal* (e.g., this is what most people in our society do), *necessary* (e.g., we need meat to be strong and survive), and *nice* (e.g., it is enjoyable and tasty to eat meat). These four categories represent over 80% of the justifications that are provided when adults are asked to provide reasons why it is *okay* to eat meat (Piazza et al., 2015). Importantly, greater endorsement of these justifications is related to greater consumption of meat, demonstrating that these justifications are powerful tools in resolving the meat paradox. However, less focus has been applied to the reasons individuals may perceive it to be *not okay* to eat animals, and how these reasoning practices may differ across childhood and adulthood. Here we consider natural, necessary, and normal as social-conventional domain concerns (nice is conceptualized as a personal domain issue as it is related to individual taste) and ask what types of reasoning from the moral domain may be used in contrast to these 4 N's.

Examining age-related differences in reasoning about eating animals offers a unique test of the developmental trajectory of domain understanding, as a moral principle (i.e., harm) conflicts with societal conventions (i.e., omnivorous diet) over which children often have little control. Adults' thinking about eating animals is aligned with the criterion judgments that are applied to social-conventional concerns (Piazza et al., 2015; Turiel, 1983). For example, conventions are seen as being decided as part of the societal context in which they occur and are not generalizable across contexts (e.g., a rule in one social setting may not apply in others). In terms of food, certain animals are eaten in some cultures and not others (e.g., cows are widely eaten in Europe, and less so in India). An alternate perspective on eating animals is possible if one views this through the lens of morality, whose criterion judgments include being non-alterable and generalizable. That is, moral principles are seen as applying across contexts and are not decided upon by consensus.

Existing evidence seems to suggest that adults see eating animals as a social-conventional issue (Piazza et al., 2015), whereas children grapple with the conflict between the moral domain (e.g., harm aversion) and social-conventional (e.g., normative eating practices) elements at play in decisions about food.

In the present work, we sample children between 9 and 11-years-old, as existing work has demonstrated that similar conflicts between moral domain and social-conventional domain concerns are being navigated during this developmental period. In contrast to younger children who place great weight on moral concerns (e.g., Vaish et al., 2011), by late childhood, awareness of group membership and social norms means that in some cases children must weigh up whether to behave in line with what is socially expected, or what moral principles might imply (Rutland et al., 2010). For example, in resource allocation tasks, children in this age range may find their desire to be fair or equal come into conflict with in-group preferences to distribute resources in favour of one's own group. In such situations, children at this age are attuned to group norms and may distribute resources in favour of their own group, contrary to their own desire for equality (McGuire et al., 2018). Given such evidence, one possibility is that children, like adults, already are aware of social conventions regarding food and provide similar reasoning to justify the acceptability of eating animals.

However, during this same developmental period, children have been shown to be highly attuned to harm aversion when thinking about animals. For example, Wilks et al. (2021) demonstrated that in moral dilemmas, children (5–9-years-old) are just as likely to want to save animal lives as human lives, in contrast to adults who will prioritize saving human lives (Caviola et al., 2021). Similarly, researchers have shown that both vegetarian and non-vegetarian children (7–12-years-old) condemn acts of harm against animals (Hussar & Harris, 2018). In relation to eating animals, we (McGuire et al., 2022) demonstrated that children (9–11-years-old), compared to adults, are less speciesist (i.e., are less likely to grant moral worth based on species membership alone; Caviola et al., 2019), believe that farm animals ought to be treated just as well as pets, and evaluate eating meat as less morally acceptable. Crucially, one study has examined the reasoning of independent vegetarian children (i.e., children who choose not to eat meat counter to their parents' own omnivorous dietary practices; Hussar & Harris, 2010). These children (6–10-years-old) were asked why they became vegetarian and referred to the harm that animals experience through meat-eating. At 11-years-old, compared to adults, children prioritize moral concerns regarding animals, and, as such, we may expect them to do so in their reasoning to a greater degree than adults.

As well as offering this domain theory perspective on reasoning about eating animals, we, for the first time, ask participants to evaluate and justify the consumption of animal *products* (e.g., milk, eggs, cheese). Although eating meat involves killing animals, eating animal products does not directly require animal death. The necessity of killing versus not constitutes a considerable moral difference. If individuals assume that less harm is caused in the production of these products, it is likely that much greater social-conventional thinking is apparent regarding eating animal products. An open question is whether adults and children hold a similar understanding of the processes involved in creating these products and therefore use similar reasoning styles. Here, we expected greater moral domain references from individuals who evaluated consuming animal products to be 'not okay' compared to those who saw eating animal products as 'okay', but the issue of age-related reasoning differences was treated as an open question.

In the present study we examined children's (9–11-years-old) and adults' reasoning regarding eating animals and eating animal products. Participants were asked to evaluate the acceptability of eating animals and their products and justify this in an open-ended manner. Overall, we expected:

Hypothesis 1. *Participants who rated eating meat as 'not okay' would reference moral domain issues (e.g., animal rights and welfare), whereas those who rated eating meat as 'okay' would reference social-conventional issues (e.g., that eating meat is natural and necessary).*

Hypothesis 2. *Regarding age, we expect that adults, more than children, will make social-conventional domain references to justify eating meat as 'okay'.*

Hypothesis 3. *Crucially, we expect that, given their strong focus on animal lives, children ages 9–11-years, relative to adults, will make more moral domain references to animal welfare, even when they state that eating meat is 'okay'.*

The question of reasoning about eating animal products was treated as an exploratory question given the lack of research in this area. Although we still expected to see social-conventional references due to perceived lack of harm in the production of these products, we did not have firm predictions regarding age in this case.

2 | METHOD

2.1 | Open science

The study was pre-registered using AsPredicted.org (for children: https://aspredicted.org/n3yg3.pdf, for adults: https://aspredicted.org/rg24e.pdf). Full materials and data can be accessed at https://osf.io/bea9m/?view_only = b9d75d7875464984bbc0f2190f5993cf. Our sample size was pre-registered, although due to the coronavirus pandemic we were unable to collect our pre-specified adolescent sample. The measures used in the study were pre-specified, and included further measures of speciesism, animal treatment and categorization that are published in the paper (McGuire et al., 2022). In our pre-registration, we stated that we would conduct multinomial logistic regression to predict use of social reasoning category use as a function of age and evaluation. However, an unexpectedly high percentage of participants provided multi-categorical reasoning responses (39% of participants used at least two categories). As a result of this, in the present paper we use a repeated measures ANOVA approach (see further information below). Our reasoning hypotheses were not pre-registered and can be treated as more exploratory than confirmatory.

2.2 | Participants

Participants ($n = 479$, female $n = 275$, male $n = 198$, other gender $n = 2$, did not report gender $n = 4$) were recruited within the United Kingdom (UK). Children ($n = 119$, M+-SD = 10.03 + - 0.72, 9-years-old - 12-years-old, female $n = 56$, male $n = 60$) were recruited from schools in a metropolitan area of the South-East of England in December 2019 and January 2020. Young adults ($n = 181$, M +-SD = 19.09 +- .85, 18-years-old - 21-years-old, female $n = 103$, male $n = 76$) were recruited from universities in the South-West of the U.K. during April 2020. Adults ($n = 179$, M +-SD = 40.97 + - 8.18, 29-years-old - 59-years-old, female $n = 116$, male $n = 62$) were recruited from across the UK using Prolific Academic (an online adult participant recruitment platform) in April 2020. Children participated with informed parental consent and their own assent. All adult participants consented and were paid £2.06 for completing the survey. Within our sample, 395 participants reported following an omnivorous diet; 84 did not (i.e., were vegetarians, pescatarians and vegans).

Participants reported their ethnicity as follows; White British ($n = 382$; 80%), Mixed Race or Dual Heritage ($n = 27$, 6%), South Asian British (including Bengali, Indian and Pakistani, $n = 16$, 4%), Black British ($n = 15$, 3%), Chinese British ($n = 2$, 0.4%), and other ethnicities ($n = 26$, 5%). Eleven participants (2%) did not report their ethnicity. Although this ethnicity distribution is representative of the area in which the data were collected, it is not representative of the U.K., which is important to consider and rectify in future work given the social-conventional nature of discussions about food.

Three-hundred and thirty-nine participants (71%) reported they were not religious and 134 (28%) reported they had a religious affiliation. Three-hundred-and-one participants (63%) reported they had animals at home, whereas 176 (37%) participants did not have any animals at home.

2.3 | Procedure and materials

Children completed the survey in their school classrooms, either on a computer using Qualtrics (Qualtrics, Provo, UT, USA), or using an equivalent paper survey. Participants completed the survey on their own, with an experimenter

present to answer clarification questions. All adult participants signed up for participation through Prolific Academic and completed the survey through Qualtrics.

2.4 | Eating animals and animal products

Participants were asked "is it okay to eat animals" and "is it to okay eat things that come from animals, like eggs, milk, or cheese?" (*okay*, *not okay*). These questions were followed by two respective open-ended "why do you think it's okay or not okay to eat animals/animal products?" questions. The open-ended reasoning box allowed for responses of approximately 2–3 sentences. This study was part of a larger data collection on age and moral evaluation of animals (see McGuire et al., 2022). In McGuire et al. (2022) an additional Likert scale of "how okay or not okay is it to eat animals/animal products" (1 = *really not okay*, 6 = *really okay*) was reported. The results of the Likert scale analysis are consistent with the findings presented in the current paper.

2.5 | Data coding and analysis plan

Reasoning responses (see Table 1 for the full reasoning framework split by domain) were coded using categories developed based on Social Domain Theory (Smetana et al., 2014; Turiel, 1983), existing work with adults (Piazza et al., 2015), and a grounded reading of the data. An initial read of the data confirmed that there were social-conventional domain references to natural, necessary, and normal (as well as personal references to nice), along with references to religious conventions about food. Further reading of the data confirmed that there were also moral domain justifications related to animal rights and welfare, as well as environmental impact and sustainability. Finally, we created a mixed domain code to capture references to the humane treatment of animals during their lives or deaths. This code was considered to involve both social-conventional and moral concerns as it referenced conventions regarding meat production, but also concerns for the wellbeing of farmed animals during their lives. Two independent researchers conducted the coding of the data. Inter-rater reliability procedures assessing 18% of responses ($n = 80$) indicated that there was good agreement between the two coders, Cohen's $\kappa = .74$.

To test our hypotheses, we examined differences in reasoning based on participants' age (child, adult) and evaluation of eating animals or animal products (*okay*, *not okay*). An initial comparison between young adults and adults suggested there were only minimal differences between the two adult age groups' use of reasoning categories. Therefore, young adults were treated as adults in our analyses. Although recent work has analysed reasoning data using a logistic regression approach, an initial descriptive examination of the coded data revealed that a larger than anticipated percentage of participants (39%) were utilising two or more categories simultaneously in their responses. Although logistic regression is a useful approach for comparing the likelihood of selecting certain categories compared to others, it does not capture the proportion of category use, nor instances where an individual has used more than one category. Given this high percentage of multi-categorical reasoning, we deemed that a repeated measures ANOVA approach would be more appropriate in this case to demonstrate the proportion of category use across participants as a function of age and evaluation. For each category, justifications were coded within categories as 1 = full use of the category (i.e., this was the only category the participant used), 0 = no use of the category (i.e., the participant did not reference this category), or a proportion in between (e.g., .5 if a category was used alongside a second category, .33 if a category was used as one of three categories, and so on).

First, we conducted repeated measures ANOVA analyses of the 'Eating Animals' and 'Eating Animal Products' reasoning responses to examine differences in use of the higher order domains from our framework (moral, social-conventional, mixed domain) as a function of our two between-subjects factors, age (children, adults) and evaluation of consumption (okay, not okay). Due to low frequency of use, the personal domain was not included in this analysis.

TABLE 1 Reasoning coding framework with definitions and examples

Category	Definition	Examples
Social-conventional domain categories		
Natural	Positive or negative appeals to biology, biological hierarchy, natural selection, human evolution, or the naturalness of eating meat	"it is natural for humans to eat meat"; "Humans are carnivores"; "Humans were meant to have dominion over animals"
Necessary	Positive or negative appeals to the necessity of meat for survival, strength, development, health, animal population control, or economic stability	"Humans need meat to survive"; "Our bodies need the protein"; "Meat provides good nutrients"; "Protein is a necessary part of our diet"
Normal	Positive or negative appeals to dominant societal norms, normative behaviour, historical human behaviour, or socially constructed food pyramids	"Society says it's okay"; "I was raised eating meat"; "Meat is culturally accepted"; "A lot of other people eat meat"
Religion	Appeals to religion, scripture, God, or divine sovereignty, without also appealing to human nature, biology or social norms	"It's allowed by my religious creed"; "According to God there is no unclean animals to eat"; "God provided them for us to eat"
Moral domain categories		
Sustainability and environmental concern	Appeals to the sustainable nature of meat as a renewable source Appeals to meat not being sustainable or a threat to the environment Appeals to scale of meat farming industry	"Fish create less waste than other animals"; "Poor for environment"; "I think it is damaging to the environment to breed animals specifically for food"
Animal rights and welfare	Appeals to the death or suffering of animals entailed by meat-eating Appeals to animal rights (i.e. animals have equal rights to life as humans)	"I don't like the idea of killing animals"; "It's wrong to harm animals"
Personal domain categories		
Nice	Positive or negative appeals to the tastiness of meat, or that it is fulfilling or satisfying	"It tastes good"; "It's delicious"
Mixed domain categories		
Ethical production and humane slaughter	Appeals to the "humane" nature of slaughtering practices or the fact that animals are not harmed during production of animal products	"As long as you know it comes from a company that does not mistreat animals"; "Humane options exist for meat products"

This analysis was followed by further repeated measures ANOVA analyses to examine the more specific categories within the domains (e.g., natural and necessary as sub-categories of the social-conventional domain). In our repeated measures ANOVA analysis of the 'Eating Animals' reasoning question we considered the five categories that were used to the greatest degree by our participants as a within-subjects variable: three social-conventional categories (Natural, 23%, Necessary, 24%, Normal, 6%), the one mixed domain category (Humane Slaughter, 9%), and one moral domain

category (Animal Welfare, 18%). In the 'Eating Animal Products' reasoning question we considered the four categories that were most referenced as a within-subjects variable: two social-conventional categories (Natural, 22%, Necessary, 13%), the one mixed domain category (Ethical Production, 40%), and one moral domain category (Animal Welfare, 9%). In both cases, age (children, adults) and evaluation of consumption (okay, not okay) were entered as between-subjects factors. We also ran these analyses separately with gender (male, female), religion (religious, not religious), pet ownership (owns pets, does not own pets) and speciesism (score from scale as presented in McGuire et al., 2022) as covariates – in both cases, the results were the same, so here we present the analyses without the covariates included. All interaction terms were interpreted using follow-up pairwise comparisons with Bonferroni corrections for multiple comparisons.

3 | RESULTS

3.1 | Eating animals

3.2 | Acceptability evaluation

An initial chi-square indicated that there were overall differences in evaluation of consumption of animals as 'okay' or 'not okay' as a function of age group, $X^2(1) = 27.81$, $p < .001$. Adults (77%, $n = 274$) were more likely to report that eating animals was 'okay' compared to children (51%, $n = 58$). Whereas children (49%, $n = 56$) were more likely to report that eating animals was 'not okay' compared to adults (23%, $n = 83$).

3.3 | Reasoning domain differences

Overall within-subjects main effect domain differences were observed, $F(2, 934) = 90.16$, $p < .001$, $\eta_p^2 = .16$. Below, the means presented are the proportion of category use by participants. Both moral ($M = .39$, $SD = .38$) and social-conventional ($M = .38$, $SD = .43$) domains were used more than mixed domain concerns ($M = .05$, $SD = .22$, $ps < .001$), while there was no significant difference in overall use between moral and social-conventional reasoning. Although both the two-way interactions between domain and evaluation of acceptability of animal consumption ($F(2, 934) = 83.97$, $p < .001$, $\eta_p^2 = .15$) and domain and age group ($F(2, 934) = 8.39$, $p < .001$, $\eta_p^2 = .02$) were significant, they were qualified by the significant three-way interaction which we move to reporting here in order to test our hypotheses directly.

The three-way interaction between domain, evaluation of acceptability of animal consumption, and age group, was significant, $F(2, 934) = 7.04$, $p < .001$, $\eta_p^2 = .02$. Among participants who reported that it was 'okay' to eat animals, there was greater use of the moral domain by children ($M = .31$, $SD = .38$) than adults ($M = .08$, $SD = .19$, $p < .001$). There also was greater use of the social-conventional domain by adults ($M = .66$, $SD = .40$) than children ($M = .45$, $SD = .44$, $p < .001$). Finally, there was greater use of mixed domain reasoning by adults ($M = .12$, $SD = .26$) than children ($M = .04$, $SD = .17$, $p = .02$). Amongst participants who reported that it was 'not okay' to eat animals, there were no significant age differences in use of the moral domain (children $M = .58$, $SD = .46$, adult $M = .58$, $SD = .44$, $p = .97$), social-conventional domain (children $M = .19$, $SD = .36$, adult $M = .21$, $SD = .35$, $p = .76$) or mixed domain reasoning (children $M = .01$, $SD = .07$, adult $M = .03$, $SD = .13$, $p = .64$).

3.4 | Reasoning category differences

The overall frequency use of reasoning categories as a function of participant age and evaluation of consumption can be found as supplemental materials. First, we observed a significant within-subjects main effect of reasoning category,
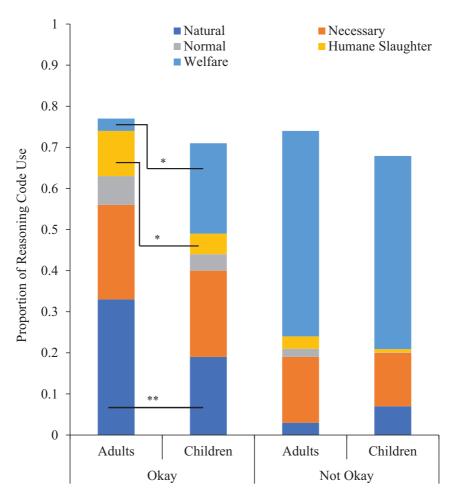
FIGURE 1 Proportion of reasoning code use for "Eating Animals" question as a function of participant age and evaluation of consumption (note: * indicates $p < .05$, ** indicates $p < .01$)

$F(4, 1892) = 38.63$, $p < .001$, $\eta_p^2 = .08$. Overall, references to Natural ($M = .24$, $SD = .38$) and Necessary ($M = .19$, $SD = .35$) justifications were used more than Normal ($M = .05$, $SD = .20$), Humane Slaughter ($M = .08$, $SD = .22$), or Animal Welfare ($M = .18$, $SD = .35$) (all $ps < .001$). We also observed a significant interaction between reasoning category and evaluation of consumption, $F(4, 1892) = 39.91$, $p < .001$, $\eta_p^2 = .08$. However, this effect was qualified by the significant three-way interaction which we move to reporting here to test our hypotheses directly.

The three-way interaction between reasoning, evaluation of consumption of animals, and age group was significant, $F(4, 1892) = 4.98$, $p < .001$, $\eta_p^2 = .01$ (see Figure 1). Looking for inter-age group differences revealed that amongst participants who reported eating animals was 'okay', adults, compared to children, made greater reference to the Natural category (children $M = .18$, $SD = .36$, adults $M = .34$, $SD = .41$, $p = .01$) and the humane slaughter category (children $M = .04$, $SD = .17$, adults $M = .12$, $SD = .26$, $p = .05$). Within this group who rated eating animals as 'okay', children compared to adults made greater reference to animal welfare (children $M = .21$, $SD = .34$, adults $M = .02$, $SD = .12$, $p < .001$).

Amongst adults, a similar pattern of results as the overall reasoning effect was apparent, with those who stated eating animals was 'okay', compared to those who said it was 'not okay' to eat animals, made greater reference to Natural (not okay $M = .03$, $SD = .16$, okay $M = .34$, $SD = .41$, $p < .001$), Normal (not okay $M = .02$, $SD = .09$, okay $M = .07$,

$SD = .23$, $p = .04$) and Humane Slaughter (not okay $M = .03$, $SD = .14$, okay $M = .11$, $SD = .26$, $p = .001$) categories. There was no significant difference between those adults who said it was 'okay' and 'not okay' in use of the Necessary category (not okay $M = .15$, $SD = .31$, okay $M = .23$, $SD = .37$, $p = .09$). In contrast, for children, there were no differences in the use of these categories between participants who stated eating animals was 'okay' and those who stated it was 'not okay'. For both adults and children, there was greater reference to Animal Welfare among those who stated eating animals was 'not okay' (adults $M = .50$, $SD = .43$, children $M = .46$, $SD = .46$) compared to those who stated it was 'okay' (adults $M = .02$, $SD = .12$, children $M = .21$, $SD = .34$, $ps < .001$).

Thus, the key age-related differences in reasoning about eating animals appear to fall amongst participants who stated eating animals was 'okay', as children's more ambivalent reasoning gave way to greater use of Natural, Normal and Humane Slaughter justifications. Participants who stated that eating animals was 'not okay' were unified in their use of Animal Welfare reasoning to justify this evaluation from childhood to adulthood.

3.5 | Eating animal products

3.5.1 | Acceptability evaluation

An initial chi-square indicated that there were marginal differences in evaluation of consumption of animal products as 'okay' or 'not okay' as a function of age group, $X^2(1) = 4.35$, $p = .056$. Adults (94%) were more likely to report that eating animal products was 'okay' compared to children (89%). In contrast, children (11%) were more likely to report that eating animal products was 'not okay' compared to adults (6%).
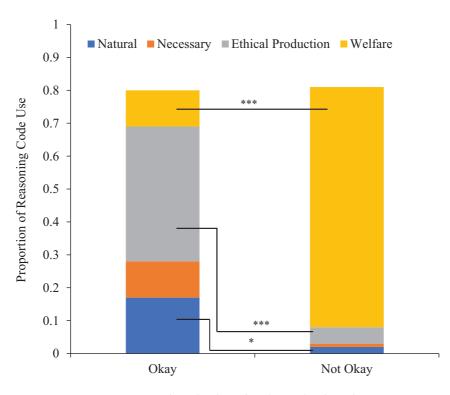
3.5.2 | Reasoning domain differences

Overall within-subjects main effect domain differences were observed, $F(2, 936) = 10.90$, $p < .001$, $\eta_p^2 = .02$. Overall, the moral domain ($M = .43$, $SD = .32$) was used more than the social-conventional ($M = .17$, $SD = .31$, $p < .001$) and mixed domain ($M = .24$, $SD = .45$, $p < .001$), whereas there was no significant difference in overall use between the social-conventional and mixed domains. There was a significant two-way interaction between domain and evaluation of acceptability of animal product consumption ($F(2, 936) = 40.41$, $p < .001$, $\eta_p^2 = .08$). Participants who reported that it was 'okay' to eat animal products made greater reference to the social-conventional domain ($M = .32$, $SD = .43$) than participants who reported it was 'not okay' ($M = .07$, $SD = .21$, $p = .005$). Similarly, participants who reported that it was 'okay' to eat animal products made greater reference to mixed domain concerns ($M = .44$, $SD = .45$) than participants who reported it was 'not okay' ($M = .05$, $SD = .19$, $p < .001$). In contrast, participants who reported it was 'not okay' to eat animal products made greater reference to the moral domain ($M = .76$, $SD = .38$) than participants who reported it was 'okay' ($M = .11$, $SD = .26$, $p < .001$).

The two-way interaction between domain and age group ($F(2, 936) = .73$, $p = .48$, $\eta_p^2 = .002$) and the three-way interaction between domain, age group, and evaluation ($F(2, 936) = 1.63$, $p = .20$, $\eta_p^2 = .003$) were not significant.

3.6 | Reasoning category differences

The overall frequency use of categories as a function of participant age and evaluation of consumption can be found as supplemental materials. Hereon, the means presented are the proportion of category use by participants. As per the first question, we observed a significant main effect of the within-subjects reasoning variable, $F(3, 1422) = 20.14$, $p < .001$, $\eta_p^2 = .04$. Participants made greater reference overall to Natural ($M = .17$, $SD = .35$) and Necessary ($M = .11$, $SD = .29$) categories compared to Animal Welfare ($M = .14$, $SD = .31$, $ps < .001$). There was no significant overall

FIGURE 2 Proportion of reasoning code use for "Eating Animal Products" question as a function of evaluation of consumption (note: * indicates $p < .05$, *** indicates $p < .001$)

difference between use of the Ethical Production ($M = .41$, $SD = .45$) and Animal Welfare categories ($p = .07$). References to Ethical Production were greater than references to the Necessary category ($p = .02$).

Further, we observed a significant interaction between reasoning category and evaluation of consumption, $F(3, 1422) = 34.13$, $p < .001$, $\eta_p^2 = .07$ (see Figure 2). Participants who rated eating animal products as 'okay', compared to those who rated eating animal products as 'not okay' made greater reference to the Natural (okay $M = .19$, $SD = .35$, not okay $M = .03$, $SD = .10$, $p = .02$) and Ethical Production (okay $M = .44$, $SD = .45$, not okay $M = .05$, $SD = .19$, $p < .001$) categories. In contrast, participants who rated eating animal products as 'not okay' made greater reference to Animal Welfare (okay $M = .10$, $SD = .25$, not okay $M = .72$, $SD = .40$, $p < .001$). There was no difference in reference to Necessary reasons as a function of evaluation of consumption (okay $M = .12$, $SD = .30$, not okay $M = .05$, $SD = .09$, $p = .08$).

There was no significant interaction between reasoning and age ($F(3, 1422) = .19$, $p = .90$, $\eta_p^2 = .000$), nor between reasoning, evaluation of consumption and age ($F(3, 1422) = 1.07$, $p = .36$, $\eta_p^2 = .002$). Thus, participants who evaluated eating animal products as morally 'okay' justified this evaluation with reference to the naturalness of doing so, and the perceived lack of harm caused to animals through ethical production methods.

4 | DISCUSSION

The current findings provide a cohesive fit with Social Domain Theory (Turiel, 1983) and offer an extension of this theory into the context of human-animal intergroup relations. Our higher-level comparisons between domains

emphasised children's focus on the moral domain as compared to adults, who were more likely to reference social conventions and mixed domain concerns. Children who rated eating animals as 'not okay' made clear moral domain references to animal rights and welfare, up to the point of seeing no moral difference between humans and animals (e.g., child rating eating animals as 'really not okay', "*because if you eat an animal it is like you are eating another human*"). Responses such as this indicate not only children's concern for animal welfare and rights, but also their anti-speciesist viewpoint. Rather than seeing such a strong moral hierarchy between human and animal lives as adults do (Caviola et al., 2019, 2022), children's reasoning sees animal lives and human lives as having equal value, consistent with their responses to a standardised speciesism scale (McGuire et al., 2022). Adults who evaluated eating animals to be 'not okay' came to similar conclusions.

Interestingly and consistent with our predictions, children who rated eating animals as 'okay' *also* made moral domain appeals to animal welfare (e.g. child rating eating animals as 'a bit okay', "*because animals have a life too*"). These findings fit with recent work that has demonstrated children to be less speciesist and more concerned with animal lives (Hussar & Harris, 2018; McGuire et al., 2022; Wilks et al., 2021). Research has shown that independent veg- etarian children decide not to eat animals through moral domain reasoning (Hussar & Harris, 2010). These findings offer the qualification that even children who believe eating animals is 'okay' are thinking about moral domain issues. Adults who rated eating animals to be 'okay', in contrast, used social-conventional reasoning that is consistent with a motivated cognition account of the meat paradox (Loughnan et al., 2014; Piazza & Loughnan, 2016; Piazza et al., 2015). That is, they stated that it was natural (e.g., adult rating eating animals as 'okay', "*it is in human nature to con- sume animal products*") and necessary (e.g., adult rating eating animals as 'okay', "*because we need to eat animals to get the right nutrition*") to eat animals. Further, adults made greater reference than children did to the mixed domain idea of humane slaughter (e.g., adult rating eating animals as 'a bit okay', "*if animals are killed in a humane way, then I am okay with it*").

Together these findings add to the growing argument that knowledge about food systems is integral to emerging speciesism and motivated cognition. Here, understanding that animals are harmed in factory farming necessitates the argument that there are farming practices that are more justifiable (e.g., free-range animal rearing). The fact that chil- dren were less likely to reference such ideas may suggest they are not yet aware of the harm caused in this process, and therefore do not need to turn to such arguments. This argument is aligned with recent research documenting that children (4–7-years-old) make basic errors in assessing the origins of food (Hahn et al., 2021). In this study, 41% of par- ticipants indicated the bacon came from a plant, whereas 6 and 7-year-old participants reported that chickens, cows, and pigs were not okay to eat. Although the children in Hahn et al. were younger than the current sample, these results may be indicative of children's understanding of food systems.

Taking a domain theory perspective, these findings imply that socialization through the acquisition of real-world knowledge is one important factor that can lead children from a moral absolutist stance on an issue (i.e., it is wrong to harm animals) to a coordinated perspective that considers conventionality (i.e., most people like me eat animals, so it is okay for me to do so) or mixed domain arguments that balance domain concerns (i.e., it is okay to cause harm under certain conditions). How this knowledge acquisition occurs developmentally is an open question that will require longi- tudinal study with a focus on when, where, and how children acquire knowledge about food systems. Further focusing on the contexts in which children are socialized and acquire this knowledge will be an important next step. For example, it will be important to understand differences in socialization of the meat paradox between urban and rural settings, the impact of socioeconomic status, or family political background.

When asked about the acceptability of eating animal products, almost all participants agreed that it was 'okay' to eat products like milk, eggs, or cheese. Like the humane slaughter category, participants referenced the ethical produc- tion of such products, claiming that animals are not harmed in the production of milk, eggs, or cheese. For example, one adult stated that eating animal products was okay because "*it usually does not involve the maltreatment of animals*". Sim- ilarly, one child participant stated eating animal products was okay because "*it does not harm the animals that it comes from*". Across development, participants shared the belief that animals do not suffer and see the naturalness of such products as justifying their consumption.

This lack of age-related differences speaks to the unique moral quality of killing in the use of animals. Children and adults appear largely in agreement that because animals are not killed to produce milk, eggs, and cheese, that using animals for these products is more permissible. Indeed, many participants believe that animals are not harmed in the production of these goods. Whether this is driven by the lack of knowledge about common modern dairy production practices or by the anthropocentric believe that humans have moral priority over other animals (Caviola et al., 2022) or both remains unclear. Again, the role and precise interaction of food systems knowledge, speciesism, and domain-based reasoning required further investigation.

In both the case of eating animals and their products, the pattern of reasoning *does* point to children's and adults' desire to reduce harm (e.g., appeals to humane slaughter and ethical production) coming into conflict with their eating practices. These findings extend social domain theory into a new context by demonstrating the competing moral and social-conventional domain concerns that are present when children and adults are asked about eating animals. As theorists have argued (e.g., Joy, 2011), there is clearly some communication of social-conventional ideas like the 4 N's to children, although they are referenced far less by 9-11-year-olds compared to adults. However, aligned with recent work, moral domain issues are of great concern to children in this age range, of which educators and policy makers interested in reducing meat consumption may take note. Researchers have demonstrated that moral messages are most effective when individuals' attitudes are based on moral concerns (Luttrell et al., 2019). Therefore, messages relying on moral concern for animals to promote animal welfare may be more effective amongst young people than with adults, where attitudes fall in the conventional domain. The developmental process underlying the shift from moral to conventional concern requires further examination both in terms of understanding the channels of communication (e.g., parents, teachers) that children use to construct their social-conventional understanding of food, as well as the role of knowledge about harm in food systems production.

From the present study it is not yet apparent whether children fundamentally are more concerned with morality, or that they are more likely to focus on one domain to justify their reasoning rather than multiple domains. The ability to focus on and coordinate multiple domains is a skill that has been shown to develop through late childhood into adolescence and adulthood (McGuire et al., 2019), and as such future work is essential to attempt to understand the role that complex domain coordination plays, perhaps in conjunction with emerging food systems knowledge. As such, a key limitation of the present work is that we were not able to recruit an adolescent sample. Given the differences between children and adults in this study, it is an important open question as to whether adolescents' reasoning is more morally or social-conventionally focused. With increased autonomy in adolescence (Smetana & Turiel, 2003), as well as the possibility that knowledge of food systems emerges here, extending this examination of reasoning and evaluation to adolescence is an important next step.

Finally, despite our efforts to use analytic methods that ensured we did not lose multi-categorical data, the present study did not examine the crossover of category use directly, or profiles of those participants who used multiple categories. This decision was in part pragmatic, as not only did 39% of participants use more than one category, but within the 'eating animals' reasoning question there were 35 different combinations of cross-category use. Understanding this kind of rich data is not well suited to quantitative methods and will require future work that focuses on qualitative methods to explore in depth the coordination between moral, social-conventional, and personal reasoning in which children and adults engage to justify their eating practices. Further, attempting to understand *who* the people are who are using multiple categories may be of interest to those seeking to understand why individuals choose to eat meat or plant-forward options. For example, pinpointing demographic profiles of participants who cite both moral and social-conventional reasons will provide insight into the groups best suited for interventions. One possibility worthy of future investigation is that differences in reasoning lie between dietary groups (e.g., vegans and omnivores). Although we did record and control for participants' dietary information in our initial analyses, further investigation is required with a stratified sample that includes equal numbers of vegans and vegetarians to compare against a predominantly omnivorous sample.

A further limitation of the work lies in the homogenous sample, who were predominantly White British. Although there is evidence that elements of the meat paradox occur consistently across cultures (e.g., common dissonance

reduction strategies), the nature of how adults learn about ethical issues surrounding meat differ across cultures (e.g., learning about meat consumption through the media in Australia, versus direct experiences of wet markets in India; Khara et al., 2021). Therefore, it is essential that future work on this topic is conducted cross-culturally and with ethnically stratified samples within cultures in order to understand the role of culturally specific norms, or alternatively, the stable nature of these differences across cultural or ethnic groups. Of course, this approach also is important for domain theory as claims about the universality of these domains require cross-cultural examination.

Taken together, there are two key conclusions to draw from this work. First, these findings offer a cohesive fit with Social Domain Theory, which we argue makes a case for the extension of this theory into the realm of human-animal inter-group relations and a focus on how external food system knowledge may inform reasoning. Second, these findings offer insight into age-related differences in domain-based thinking about animals. Between 9 and 11-years-old, children are beginning to face the conflict between their strong sense of moral concern and their burgeoning understanding of the connection between animals and food. By adulthood, motivated cognition and reasoning processes are well-established amongst people who choose to eat meat. Although many participants showed some hint of their moral domain concern for animals (e.g., by referencing ethical farming), decisions about whether to eat animals in adulthood appear to be made largely with reference to conventions. Therefore, those interested in promoting plant-based diets must consider the developmental stage at which they wish to communicate their message; in adulthood messages must focus on conventions, rather than a strictly moral message, which may be most effective in childhood.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in Open Science Framework at https://osf.io/bea9m/?view_only=b9d75d7875464984bbc0f2190f5993cf.

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