



Willingness to Reduce Animal Product Consumption: Exploring the Role of Environmental, Animal, and Health Motivations, Selfishness, and Animal-oriented Empathy

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Abstract

Increasing the willingness to reduce animal product consumption has the potential to contribute to ameliorating the impact of animal agriculture on the environment, as well as foster healthier diets and improve the lives of farmed and wild animals. Reduction of animal product consumption is a prosocial behaviour (PSB), and factors that are considered to influence it are empathy and selfishness. In this research, animal-oriented empathy examined empathy specifically for animals. Animal oriented empathy and three types of selfishness: adaptive, egoistic, and pathological were measured to determine if they could predict willingness to reduce animal product consumption. PSB is also influenced by motivations and motivations can lead to willingness. The three most common motivations to reduce animal product consumption: animal welfare, the environment, and health were examined to determine whether they predict willingness. A sample of 492 Australian adults completed questionnaires via the Zoho survey platform, and the data underwent a hierarchical regression. Higher pathological selfishness predicted a greater willingness to reduce animal product consumption, as did environmental and animal welfare motivations. However, higher health motivation predicted a lower willingness to reduce animal product consumption. Interpretation of the perplexing results in relation to pathological selfishness suggested further research. The practical value of utilising environmental and animal motivations to increase willingness to reduce animal products whilst bringing attention to the health issues was also discussed.

Keywords Willingness to reduce animal product consumption · Adaptive selfishness, egoistic selfishness · Pathological selfishness · Animal-oriented empathy · Environmental, animal, and health motivations

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Introduction

There is overwhelming evidence about the catastrophic consequences of global warming and the significant contribution of animal agriculture in perpetuating climate change and environmental degradation (Masson-Delmotte et al. 2022; Shukla et al. 2019; Tufford et al. 2023). As knowledge of the negative impacts of animal agriculture increases, there has been a rise in interest in plant-based diets and the reduction of meat consumption (Alae-Carew et al. 2022; Alcorta et al. 2021; Clem 2021; Grassian 2020). Environmental devastation is a worldwide issue, both practical and ethical, as is the cruelty and exploitation of animals inherent in animal agriculture (Bryant 2019; Gullone 2017; Hannan 2020; Pluhar 2010). Evidence that meat consumption, mainly red and processed meats, harms health is another consideration driving an increase in willingness to reduce animal product consumption and interest in plant-based diets (Camilleri et al. 2020; Boada et al. 2016).

Awareness of the damage of animal agriculture to the climate, animals, and health is not yet sufficient to convince consumers to become more willing to reduce or abstain from eating meat or animal products as the majority are found to be unwilling (Hartmann and Siegrist 2017; Hoek et al. 2017; May and Kumar 2022; Macdiarmid et al. 2016; Sanchez-Sabate and Sabaté 2019; Valli et al. 2022). This lack of willingness to decrease consumption is reflected in the increase in meat consumption worldwide over the last 60 years and the current high levels of meat consumption (Godfray et al. 2018; Graça et al. 2015; Malek et al. 2019; Sans and Combris 2015), which is comparatively high in Australia (Marinova and Bogueva 2019). This is highlighted further by the low numbers of the population who have reduced their consumption to nil. Despite an increase availability of plant-based meats and an increase in the number of vegans in some Western countries, the rate of veganism is still low, such that estimates put it at 1–3% world-wide (Buttny and Kinefuchi 2020; Loh et al. 2021; Menzies et al. 2023). In the country targeted in this study, Australia, the number of vegans was found to be 1.6% (Malek and Umberger 2021). More females and the younger generation are vegan, with rates decreasing with increasing age (Fleck 2023; Rosenfeld 2019).

Rates of willingness vary widely according to the country where measures were taken, and the kinds of variables and questions used. Around half of the sample from the United States of America indicated they are willing to eat less red meat and more plant-based meat alternatives (Leiserowitz et al. 2020). Other research showed a rate of 11.5% of Danes (Hielkema and Lund 2021), 48.5% of Portuguese (Graça et al. 2015), and 41% of Polish participants (Szczybylo et al., 2022) were willing to reduce meat consumption. The country where this research was undertaken, Australia, is the least willing to reduce meat consumption or eat alternatives compared to the UK and China (Ford et al. 2023). Most are not willing (46%) (Malek et al. 2019), with 22% indicating a willingness to reduce meat consumption (Malek et al. 2019). All the research accessed covered willingness to reduce meat consumption; no studies that examined all animal products could be found.

Determining what factors contribute to willingness to reduce animal product consumption could lead to finding mechanisms to achieve a reduction in the consumption of animals and their by-products (de Boer et al. 2017; Harguess et al. 2020; Ruby 2012; Wolstenholme et al. 2021). Willingness varies according to demographics, personality, and motivation (Harguess et al. 2020). Willingness is a part of the process of behaviour change and can predict meat reduction (Seffen and Dohle 2023). Thus, it can be considered a precursor to

reducing meat consumption. As meat reduction is a prosocial behaviour (PSB) (Klein et al. 2022), and willingness is a component in the process of meat reduction; it is conceivable that willingness is an influence in PSB.

Prosocial behaviour is usually defined as behaviour that serves to benefit others (van Kleef and Lelieveld 2022) and empathy and selfishness are both implicated in PSB (Crocker et al. 2017; Graves and Roelich 2021; Klein et al. 2022). PSB is considered to have been crucial to our survival and evolution, potentially explaining our success more than selfish actions (Crocker et al. 2017; Sonne and Gash 2018), and it continues to be significant to humanity, as are empathy and selfishness. Since empathy and selfishness influence PSB (e.g. Crocker et al. 2017), it was thought they would likely influence the PSB of not eating animals and products taken or derived from them as well as the willingness to reduce animal product consumption. Also, both have been found to be associated with meat consumption (Holler et al. 2021; Dillon-Murray et al. 2023), so it was postulated that they could also relate to willingness to reduce animal product consumption.

It would be expected that higher levels of empathy would be more likely to lead to PSB than higher selfishness since empathy is other-focussed and selfishness is self-focussed (Decety and Norman 2015; Mestre et al. 2019), and they are negatively correlated (Raine and Uh 2018). This is supported by research that found a positive connection between empathy and PSB (Telle and Pfister 2016) and a negative relationship between self-centredness and prosocial motives (Hopwood et al. 2021). Prosocial motives are those that drive prosocial behaviour for which the benefit of others is the primary aim (van Kleef and Lelieveld 2022). Both motivation and willingness are suggested as being part of the process leading to meat reduction (Harguess et al. 2020; Seffen and Dohle 2023), a PSB, but there is limited research examining whether there is a link between the two constructs in animal product consumption. The current research aims to redress this lack of evidence.

Therefore, in addition to whether empathy and selfishness lead to willingness to reduce animal product consumption, this research proposed to examine whether the three motivations for meat reduction (environmental, animal welfare, and health) also influence willingness to reduce consumption of animal products, both meat and non-meat.

Animal-Oriented Empathy

The lowest animal product consumption is found in those with the highest empathy Camilleri et al. 2020; Holler et al. 2021; Niemyjska et al., 2018; Zickfield et al., 2018). Vegans, who do not consume any animal products, have higher empathy than all other dietary groups (Kessler et al. 2016; Rothberger, 2015), not just with self-reported empathy but with measures of brain activity (Filippi et al. 2010). They have demonstrated a willingness to reduce animal product consumption by having already enacted the PSB of not consuming them. As vegans have higher levels of empathy than all other dietary groups, it can be argued that willingness is associated with higher levels of empathy. In this case animal-oriented empathy is of interest in this research since it relates to behaviour that affects animals and is different from human-oriented empathy (Paul 2000; Apostol et al. 2013).

Although there is minimal research that has measured general willingness to reduce animal product consumption against empathy, there are several studies that show willingness not to eat meat that was presented in a specific way compared to another presentation is related to empathy (Earle et al. 2019; Harguess et al. 2020; Kunst and Haugestad 2018;

Kunst and Hohle 2016). For example, showing pictures of a meat product with a picture of the animal which the meat came from versus those with just the meat without the animal's picture resulted in higher levels of empathy and less willingness to eat the meat presented in the image (Kunst and Hohle 2016). There were none found in the literature that examined selfishness and willingness to reduce animal product consumption.

Selfishness

Although selfishness is considered important in human society, this is not reflected in the level of research investigating selfishness as a personality trait or psychological construct (Carlson et al. 2022; Diebels et al. 2018; Raine and Uh 2018). More has been carried out measuring behavioural selfishness, commonly in economic games, where subjects choose to allocate money to strangers or keep it for themselves (Raine and Uh 2018). Carlson et al. (2022) defined psychological selfishness as perceiving a situation where there is a desire to benefit the self that ignores others' wishes and goes against social expectations. To assist in addressing the dearth of research, a direct and standardised measure of selfishness as a psychological construct was developed, the Selfishness Questionnaire (SQ) (Raine and Uh 2018), which partitioned selfishness into three types, which also corresponded to different levels depending on how damaging they are to others. Adaptive selfishness is the least damaging to others, where the benefit to the self is the priority, but others may also reap advantages, such as close friends and family (Raine and Uh 2018). With egocentric selfishness, the attention is wholly on the self without concern for others and pathological selfishness is described as the most damaging and is where others are harmed to gain an advantage to the selfish person (Raine and Uh 2018).

No research could be found examining psychological selfishness against willingness to reduce animal product consumption, so extrapolating levels of selfishness from studies of related constructs aided in determining the possible relationship. Studies revealed self-interest played a part in not limiting meat consumption (Malek and Umberger 2021; Waldman et al. 2023), and omnivores were more self-centred (Hopwood et al. 2021). The 'dark triad' (Deutchmann & Sullivan, 2018) is associated with higher levels of meat consumption and a lower likelihood of reducing meat consumption (Palnau et al. 2022; Sariyska et al. 2019). The dark triad is a combination of the related traits of psychopathy, Machiavellianism, and narcissism. Psychopathy describes antisocial tendencies with a lack of remorse, Machiavellianism is characterised by a lack of morality and manipulation of others for personal gain, and narcissism by grandiosity and a sense of superiority and entitlement (Book et al. 2015; Deutchmann & Sullivan, 2018).

Dark triad traits are characterised by selfishness and a lack of empathy (Deutchmann & Sullivan, 2018; Dinić et al. 2023; Wai & Tiliopolous, 2012) and the definition of dark traits as maximising advantages to the self whilst causing damage to others (Mertens et al. 2020; Moshagen et al. 2018) aligns with the definition of pathological selfishness (Raine and Uh 2018). Pathological selfishness was associated with higher dark traits than egoistic and adaptive selfishness (Raine and Uh 2018). Based on those high in dark triad traits being less likely to reduce meat consumption (Palnau et al. 2022), it can be extrapolated that pathological selfishness would be associated with less willingness to reduce meat and non-meat animal products.

The research outlined on the dark triad and the other constructs related to selfishness and meat reduction indicates that selfishness may be associated with a lower willingness to reduce meat consumption. As empathy and selfishness are negatively correlated (Raine and Uh 2018) and empathy has a positive relationship with willingness, selfishness is likely to be associated with less willingness. Empathy and selfishness are related to animal, environmental, and health motivations to reduce animal product consumption (Dillon-Murray et al. 2023). However, whether the motivations influence willingness is underdetermined, the second factor to be explored in this study.

Motivations

Prosocial behaviour is influenced by prosocial motivations (Aydinli et al. 2014), and since meat reduction can be defined as a type of PSB (Klein et al. 2022), it could be extrapolated that prosocial motivations lead to meat reduction. Motivations influence intentions to reduce meat consumption (Zur and Klöckner 2014) and as willingness and intention are related (Pomery et al. 2009; Seffen and Dohle 2023), it would be expected that motivations would also influence willingness to reduce meat consumption. Although the motivations to reduce animal product consumption have been investigated in relation to differences between dietary groups and level of meat consumption, there is meagre evidence examining it in relation to the willingness to reduce animal product consumption. Understanding which motivations lead to the most willingness to reduce animal product consumption will assist in the overall goal of animal product reduction, as using the most effective motivation would be expected to increase willingness and subsequent animal product reduction.

The three most frequently given motivations to reduce meat consumption are health, animal-related (ethics, welfare), and the environment (Bryant 2019; Hopwood et al. 2020; Malek et al. 2019; Schenk et al. 2018). However, different dietary groups vary in the type of motivations they find most convincing (Hopwood et al. 2020) and, consequently, which motivation is most effective in increasing willingness to reduce (De Backer and Hudders 2014; Malek et al. 2019; Neff et al. 2018). A pattern found repeatedly in the literature is that those who eat the least meat, particularly those who do not eat any animal products (vegans), chose animal welfare reasons as their motivation for reducing meat consumption more frequently than omnivores (Holler et al. 2021; Kessler et al. 2016; Rosenfeld 2019) and higher meat consumption was accompanied by lower endorsement of animal welfare and environmental motivations (Bryant 2019; Verain et al. 2022).

Omnivores of different kinds (reducer, flexitarian) are more likely to give health as their highest rated motivation to reduce meat consumption than the groups who abstain from meat consumption (De Backer and Hudders 2014; Hopwood et al. 2020; Malek et al. 2019; Neff et al. 2018; Verain et al. 2022). However, health can be perceived as both a motivator and a barrier to meat reduction (Sanchez-Sabate and Sabaté 2019), with the belief that eating meat is healthy (Szczybylo et al., 2022; Malek et al. 2019; Strässner and Hartmann 2023) counteracting the willingness to reduce.

Based on the results on motivations, it is possible that willingness would follow a similar pattern. Those who have already eliminated all animal products from their diet (vegans) were likely to have been willing because they have also translated it into action. Providing animal motivations as their primary motivator may suggest that animal motivations led to a higher willingness for some people to become vegan. In contrast, based on meat consump-

tion research, it would be expected animal motivations may not provide the same impact on willingness for omnivores, and health would lead to more willingness. This assumption is challenged by a recent study that showed selecting animal welfare reasons for reduction was related to a higher willingness to reduce meat consumption in omnivores, but environmental and health concerns had no effect (Roozen and Raedts 2023). As there is a lack of research in this area, more is required to determine which motivations have the most impact on willingness to reduce animal product consumption.

The Present Study

Although there is research on how meat consumption relates to animal-oriented empathy, there is minimal published research exploring it as a predictor of willingness to reduce animal product consumption. Nor is there any examination of the role the three different types of selfishness play in the willingness to reduce animal product consumption. How the most common motivations to reduce animal product consumption (animal welfare, environmental and health) relate to the willingness to reduce animal consumption is also underexplored. This research is unique by being the first study to measure psychologically defined selfishness against willingness to reduce animal product consumption and measure willingness of non-meat and meat animal products.

Thus, this research aims to narrow the gap in these areas by examining how personality and motivational factors relate to willingness to reduce animal product consumption, thereby adding to knowledge about the most appropriate enablers and barriers to target in meat reduction interventions.

This article uses the same sample and explores some of the same constructs as a previous study (Dillon-Murray et al. 2023) but has a different focus—the willingness to reduce animal product consumption.

This research aims to answer questions about how personality factors and motivations relate to willingness to reduce meat consumption. The hypotheses and their rationales are described as follows:

H1 Higher animal-oriented empathy will be associated with a higher willingness to reduce animal product consumption.

Due to animal-oriented empathy being higher in those who do not consume any animal products, it is postulated that they were more willing to reduce animal product consumption than those who consume the most.

H2 Higher scores on all three types of selfishness will be associated with a lower willingness to reduce meat consumption, with pathological having the lowest, egoistic next, then adaptive the highest.

The three types of selfishness reflect different levels, with pathological being the most selfish as it is the most damaging of all three. Thus, different levels of willingness are expected to be associated with varying levels of selfishness. Empathy and selfishness are negatively correlated, and if empathy is expected to enhance willingness, then selfishness would do

the opposite. Also, other related constructs (e.g. self-centredness) and the connection with the dark triad, which is associated with a lack of willingness to reduce (Palnau et al. 2022), have led to this hypothesis. Since being high on dark triad traits suggests a high level of selfishness and dark triad traits are linked with a lower probability of decreasing meat consumption, it could be argued that willingness to reduce animal product consumption would be lower in those with higher selfishness. Also, the link between dark triad traits and pathological selfishness would suggest that pathological selfishness is most likely associated with the least willingness to reduce animal product consumption.

H3 All three motivations will be associated with willingness to reduce animal product consumption. Health will be the highest rated motivation, and animal motivation will be the lowest.

Since the sample is primarily omnivorous, it would be expected that health would be the highest rated based on previous research, and therefore, the motivation most related to willingness to reduce animal product consumption.

Methods

Participants and Procedure

The Zoho survey platform was used to administer an online survey to 526 participants. Zoho allows the selection of a representative sample of the population, in this case, Australians between the ages of 18 and 80. Ethical approval was granted by the University of Southern Queensland Human Research Ethics Committee (reference number H22REA128).

The number of participants responding as non-binary, transgender, and other was too low ($n=8$) to use in statistical operations, so these were left out of the sample, as well as those who did not complete their surveys (19). Multivariate outliers were eliminated (using Mahalanobis distance), and the remaining sample was 492. The sample size is less than the previous study using this sample (Dillon-Murray et al. 2023) as both statistical models use slightly different variables and analysis, so there will be some variation in multivariate outliers.

Measures

Willingness to Reduce Meat Consumption

Willingness to reduce animal product consumption was measured in a similar method to that reported by Graça et al. (2015) by asking the question: “Please indicate your willingness to reduce your consumption of animal products” with responses on a Likert scale with from 1: Not willing” to 5: “Very Willing.” The only difference was the inclusion of an option to say not applicable, “already vegan,” as some participants may already not eat any meat.

Empathy

Animal empathy was measured with the 22-item Animal Empathy Scale (AES) (Paul 2000). This scale has questions in 9-point Likert scales from *Strongly Agree* to *Strongly Disagree*. The scale measures the level of empathy toward animals a person has, with questions indicating high empathy, “It makes me sad to see an animal on its own in a cage,” and those that would show lower empathy, “It is silly to become too attached to one’s pets.” Internal consistency for the AES in this sample was rated as good ($\alpha = 0.80$).

Selfishness

The Selfishness Questionnaire (SQ) (Raine and Uh 2018) was used to measure selfishness. It has 24 questions on a Likert scale, rating scores from 0 to 2 from *Agree* to *Disagree*. Individuals rate their agreement or disagreement with statements such as, “I’m not too concerned about what is best for society in general.” It has three subscales: Egocentric, Pathological, and Adaptive. This research used a 17-item version of the scale, and internal consistency was excellent ($\alpha = 0.92$).

Motivation

The Vegetarian Eating Motives Inventory (VEMI) (Hopwood et al. 2020) measures health, environment, and animal rights as motives for vegetarian diets (Hopwood and Bleidorn 2019). It also covers reasons to choose a vegan diet as their main motivations are similar. In this The VEMI has 15 items with 7-point Likert Scales from *Not Important* to *Very Important* with three subscales (Animal, Environment, and Health); each has five items. Examples of the different subscale questions are as follows: Animal: “Animal rights are important to me”; Environment: “Eating meat is bad for the planet”; Health: “I want to be healthy.”

Data Analysis

Descriptive statistics were generated for the categorical and continuous variables. Religion was collapsed into dichotomous variables (no religion=0; religion=1). Males and females were coded 0 and 1, respectively. The *Very Willing* rating included those who answered, *Already Vegan*. A power analysis using GPower revealed that the minimum sample size to detect a moderate effect size was 104 participants. As no scores were over 0.90 and the VIF scores were all below 5, no issues with multicollinearity were found.

IBM SPSS Version 29 was Used to Conduct the Statistical Analyses

A hierarchical regression was conducted to test the hypotheses. The predictor variable was the willingness to reduce consumption. The first step included the demographic variables: religion, gender, education, income, and age. Personality variables, including empathy and adaptive, egoistic, and pathological selfishness, were introduced in the second step. The third step added the three motivations: health, environment, and animal.

Results

Descriptive data, including demographics and willingness to reduce animal product consumption, are shown in Table 1, and correlations between target, predictor, and control variables were produced and provided in Table 2.

The results of the hierarchical regression model of the predictors of willingness to reduce animal product consumption are outlined in Table 3.

As seen in Table 3, results showed that for the first regression model, the willingness to reduce animal product consumption, the first step was significant, $F(5,486)=13.09, p<.001$, and the demographic variables accounted for 11.9% of the variance in willingness to reduce animal product consumption. The addition of empathy and the three selfishness variables (adaptive, egoistic, pathological) in step two ($F(4,482)=10.18, p<.001$) significantly improved on the first model ($\Delta R^2=0.04, p<.001$) and explained 16.0% of the variance.

An additional significant 28.2% of the variance in willingness was explained by introducing motivations to the final step ($\Delta R^2=0.28, p<.001$). The final model accounted for 44.2% of the variance in willingness to reduce animal product consumption ($R^2=0.44, F(3,479)=31.597, p<.001$). This third step revealed religion and higher pathological selfishness predicted a higher willingness to reduce animal product consumption ($\beta = 0.09, p<.05$; $\beta = 0.15, p<.05$, respectively). Health motivation predicted a lower level of willingness to reduce meat consumption ($\beta = -0.14, p<.001$), whilst environmental ($\beta = 0.51,$

Table 1 Descriptive data
($N=492$)

Variable	($N=492$)
Age	34.98 (SD=12.10)
Range	18–79 years
Gender	
Male	248 (50.4%)
Female	244 (49.6%)
Religion	
No	248 (50.4%)
Yes	244 (49.6%)
Education	4.89 (SD=2.89)
Income(AUD)	2.12 (SD=0.99)
Willingness	3.29 (SD=1.36)
1 Not willing	84 (16.9%)
2	49 (9.9%)
3	122 (24.5%)
4	127 (25.6%)
5 Very willing	115 (23.1%)
Personality	
Empathy	5.55 (SD=1.12)
Adaptive Selfishness	2.00 (SD=0.52)
Egoistic Selfishness	1.89 (SD=0.55)
Pathological Selfishness	1.79 (SD=0.61)
Motivations	
Health	5.56 (SD=1.22)
Environment	4.50 (SD=1.57)
Animal	5.16 (SD=1.32)

Table 2 Correlations of the predictor, control and target variables (N=492)

Variable	Willing	Religion	Gender	Educ	Income	Age	Emp	Adapt	Ego	Path	Health	Env
Willingness												
Religion	0.24**											
Gender	0.10*	0.23**										
Education	0.29**	0.31**	0.24**									
Income	0.24**	0.19**	0.28**	0.59**								
Age	0.02	0.22**	-0.02	0.06	0.02							
Empathy	-0.08	-0.11*	-0.18**	-0.16**	-0.16**	0.13**						
Adaptive	0.14**	0.09*	0.19**	0.21**	0.25**	-0.14**	-0.28**					
Egoistic	0.14**	0.09*	0.22**	0.20**	0.23**	-0.08	-0.36**	0.73**				
Path	0.27**	0.17**	0.28**	0.30**	0.31**	-0.13**	-0.35**	0.79**	0.76**			
Health	0.17**	0.18**	0.09*	0.13**	0.08	0.06	0.12**	0.13**	0.04	0.10*		
Environ	0.63**	0.24**	0.14**	0.30**	0.23**	0.03	-0.02	0.21**	0.20**	0.32**	0.40**	
Animal	0.43**	0.10*	-0.01	0.10*	0.04	0.10*	0.28**	0.05	0.04	0.09	0.51**	0.65**

* $p < .05$, ** $p < .01$

$p < .001$) and animal motivations ($\beta = 0.16, p < .002$) predicted a higher willingness to reduce meat consumption.

The results led to rejecting Hypothesis 1 as the relationship between empathy and willingness was not significant, suggesting empathy is not associated with willingness to reduce animal product consumption. Hypothesis 2 was rejected because there was no significant relationship between adaptive or egoistic selfishness and willingness to reduce animal product consumption. The results went in the opposite direction concerning pathological selfishness; it predicted a higher willingness to reduce animal product consumption. Hypothesis 3 was only partially supported, as although all three motivations significantly predicted willingness to reduce animal product consumption, health was related to a lower willingness. The part of hypothesis 3 that was in the anticipated direction was environmental and animal-related motivations, which were predictors of higher willingness to reduce animal product consumption.

Discussion

Animal-oriented Empathy and Selfishness

The rejection of the hypothesis that animal-oriented empathy would predict a greater willingness to reduce animal product consumption contrasts with previous research. Although most of the previous research measured willingness in relation to presentations of specific meat samples rather than willingness to change diet overall, the studies that showed vegans are higher in empathy and those that indicated lower empathy is associated with higher levels of meat consumption suggested that empathy would be related to willingness to reduce animal product consumption. Considering vegans have already eliminated all animal products from their diet, this suggests a prior willingness to reduce. As they have already reduced, questions about willingness are moot, hence the question whether they are already vegan being included in the study. The studies that show vegans have the highest empathy also lend support to the argument that those that are higher in animal-oriented empathy have already reduced their consumption, and so may not have high willingness to reduce any further.

The most unexpected result was that higher pathological selfishness predicted the willingness to reduce consumption whilst adaptive and egoistic selfishness did not. Previous research which found those who are high in selfishness and dark triad traits have higher meat consumption (Dillon-Murray et al. 2023; Sariyska et al. 2019) and less willingness was associated with higher meat consumption, and the dark triad (Palnau et al. 2022) is inconsistent with the present results and the nature of pathological selfishness. Willingness to reduce animal product consumption or endorsing the response would be expected to provide some advantage to those high in pathological selfishness as it is marked by a self-serving attitude where others are harmed for their benefit, not by being prosocially oriented. In this case, no obvious harm to others is revealed. Here it was expected that the harm to others would be indirect through eating animals and their products, as this causes harm to animals through cruelty, exploitation, and displacement of wild animals. It would be anticipated that those high in pathological selfishness would not be concerned about harm to animals and, therefore, would not be willing to reduce for these reasons. Those high in dark

Table 3 Hierarchical regression model predicting willingness to reduce animal product consumption

Variable	B [95% CI]	β	R^2	ΔR^2	F	ΔF
Step 1			0.12		13.09***	
Religion	0.48 [0.23, 0.73]	0.18***				
Gender	-0.04 [-0.29, 0.20]	-0.02				
Education	0.09 [0.04, 0.14]	0.19***				
Income	0.13[-0.01, 0.28]	0.10				
Age	-0.004 [-0.13, 0.01]	-0.03				
Step 2			0.16	0.04***	10.18***	5.89***
Religion	0.42 [0.17, 0.67]	0.15***				
Gender	-0.13 [-0.37, 0.11]	-0.05				
Education	0.07 [0.02, 0.12]	0.16**				
Income	0.10 [-0.04, 0.24]	0.07				
Age	-0.001 [-0.01, 0.01]	-0.01				
Empathy	0.04 [-0.07, 0.15]	0.03				
Adaptive	-0.38 [-0.75, -0.01]	-0.15*				
Egoistic	-0.19 [-0.52, 0.14]	-0.08				
Pathological	0.82 [0.47, 1.17]	0.37**				
Step 3			0.44	0.28***	31.60***	80.70***
Religion	0.25 [0.05, 0.46]	0.09*				
Gender	-0.12 [-0.31, 0.09]	-0.04				
Education	0.03 [-0.01, 0.07]	0.07				
Income	0.08 [-0.04, 0.20]	0.06				
Age	-0.002 [-0.01, 0.01]	-0.02				
Empathy	-0.081 [-0.18, 0.02]	-0.07				
Adaptive	-0.20 [-0.51, 0.11]	-0.08				
Egoistic	-0.19 [-0.47, 0.08]	-0.08				
Pathological	0.34 [0.05, 0.64]	0.15*				
Health	-0.15 [-0.24, -0.06]	-0.14***				
Environment	0.44 [0.36, 0.53]	0.51***				
Animal	0.17 [0.06, 0.27]	0.16**				

* $p < .05$; ** $p < .01$; *** $p < .001$

triad traits are negative about and towards animals, having engaged in more animal cruelty than the general population (Kavanagh et al. 2013). The advantage to the self may explain the association between willingness and pathological selfishness.

Perhaps understanding the impact for themselves may have prompted the increased willingness of those higher in pathological selfishness. As outlined in the introduction, health issues and climate change are already impacting humanity, and the situation is anticipated to deteriorate. Specific individuals would be more concerned about the impact on themselves than on others. Another alternative could be related to the gap between being willing and actual change (Cheah et al. 2020). Stating you are willing differs from the actual reduction of animal product consumption. It is feasible that those high on pathological selfishness may be more likely to appear willing without the associated action compared with those lower on the scale. The connection of pathological selfishness with the dark triad may illuminate this concept further.

Those higher in pathological selfishness are also higher in dark triad traits (Raine and Uh 2018). Deception is another notable characteristic of those with high dark triad traits (Jonason et al. 2014), so whether they are willing to reduce animal product consumption could be questionable. The narcissistic element of the dark triad is associated more with self-deception than intentional lying for advantage, as with psychopathic and Machiavellian traits (Jones and Paulhus 2017). Thus, endorsing willingness, without any real intention of changing behaviour, could be due to appearing to be doing the right thing for egoistic, self-centred reasons (Kesenheimer and Greitemeyer 2021). Although the questions were anonymous, those higher in pathological selfishness may have been endorsing higher willingness to appear to be more moral or socially desirable, mainly those persons higher in narcissistic traits of the triad.

Although the pathological selfishness results are challenging to explain, this was not so for motivations. This was more straightforward, with all three motivations providing predictive value in relation to willingness.

Motivations

This research provides evidence that motivations predict willingness to reduce animal product consumption; two were positive predictors (environment and animal), and one was negative (health). Environmental motivation was the best predictor of willingness to reduce consumption, accounting for 51% of the variance. Awareness of the environmental issues related to meat consumption has increased in recent years (Grummon et al. 2022), which may be reflected in these results. This contrasts with the research where environmental motivations were not as prevalent as consumers were not as aware or accepting of the impact of animal agriculture on the environment (Macdiarmid et al. 2016; Sanchez-Sabate and Sabaté 2019).

Animal welfare motivation also predicted increased willingness but at a lower level than environmental motivation. Knowledge of animal welfare has also increased, with Australians indicating a concern with the treatment of farmed animals (Fleming et al. 2020; Futureeye, 2018), which may explain that although most of the sample reported eating animal products, animal motivations did have some impact on willingness.

As there is negligible research with respect to the three motivations and willingness, it is difficult to compare the study to previous research. There was one related study found by Roozen and Raedts (2023), who found no effect on willingness for the environment or health, but animal welfare led to a higher willingness to reduce. The similarity is that animal motivation was connected to willingness but it was not the highest predictor of willingness in the present research. As motivation was predicted to be connected to willingness, it was anticipated that health would have a more significant impact on willingness, given the majority of the sample were omnivores and in previous research have generally been more motivated by health (e.g. Bryant 2019).

Health motivations predicted significantly less willingness to reduce consumption, indicating that health motivations decrease the willingness to reduce animal product consumption. This contrasts with a significant portion of the literature which reports that omnivores select health as a reason to reduce meat consumption more frequently than environmental and animal reasons (e.g. Hopwood et al. 2020). Health can lead to willingness and work against it. These results suggest animal product consumption is considered as healthy to

many consumers, with numerous studies showing many view meat as nutritious and necessary for a healthy diet (Clonan et al. 2016; Collier et al. 2021; Neff et al. 2018; Valli et al. 2019). Like this research, Silva Souza and O'Dwyer (2022) found health was not as strong an influence on a positive attitude toward animal product reduction as animal rights and the environment.

Conclusion and Implications

This study examined the predictive power of personality factors and motivations on willingness to reduce animal product consumption. The combination of factors and the measurement of variables previously not analysed in this context presented a unique perspective on personality, motivation, and willingness to reduce animal product consumption. Analysing willingness to reduce animal product consumption, encompassing meat and non-meat products, expanded on previous research, which mainly measured willingness to reduce meat consumption. It has also forged new ground by using a psychological measure of three types of selfishness. The research showed willingness was higher for participants with a higher level of pathological selfishness and those who endorsed environmental and animal motivations, while health had the opposite relationship.

The implications of these results show that demonstrating how reducing animal product consumption would benefit very selfish individuals could effectively encourage them to reduce consumption. Results on the relationship between motivations and willingness aligned more with the hypotheses and may provide more utility in relation to directions for advocacy.

Appealing to people motivated by environmental and animal reasons is anticipated to be more effective to reduce animal product consumption than those high in pathological selfishness as the numbers of the latter are much smaller. Increasing willingness by providing materials or through approaches that appeal to environmental factors is also suggested, as evidenced by the environment being the most motivating factor to reduce animal products. Animal welfare arguments could enhance motivation and willingness, particularly for those who find the animal-related perspectives most convincing. Using health as a motivator is not recommended as it would appear to have the opposite effect and lead to less willingness to reduce animal consumption. Providing data explaining the health issues related to, especially high meat consumption, may counteract misinformation.

Further research is recommended to determine the mechanisms to account for the patterns discovered in this research. Determining the reasons for those higher in pathological selfishness reporting more willingness would be particularly useful. Further research on pathological selfishness in relation to the dark triad and willingness to reduce animal product consumption could potentially provide the answers.

Limitations

Although the research was exploratory, there were some limitations, such as the data being self-reported by the participants who may have responded inaccurately, intentionally, or unintentionally. There were no questions to directly assess lying, as are frequently found in

psychometric assessment tools, so for future surveys of this kind a “lying question” or the recently developed lying scale could be used (Makowski et al. 2023) as well as dark triad assessment questions. This would be anticipated to determine more accurately whether participants were lying about their willingness and whether it was potentially due to being high in dark triad traits. As those on the not on the dark triad also lie on surveys it would capture more information and provide more reliable results overall.

To address the issue of lying in surveys, future research could incorporate open-ended surveys or interviews that allow for more in-depth responses. For example, follow-up interviews to explore suspicious responses. Including ethical dilemma-type questions or tasks involving behavioural choices, such as hypothetical “what if” scenarios, can provide insights into how participants might act in real-life situations, thereby revealing more about their true behaviours and inclinations. These methods can help researchers detect inconsistencies in responses and understand the factors that might lead to dishonesty. This would be particularly helpful with socially undesirable behaviour such as those driven by selfishness. Additionally, triangulating survey data with other data sources, measuring response times, or using techniques such as the implicit association tests, which measure attitudes that participants may be reluctant to report, could be utilised. These techniques and combinations thereof could further validate the authenticity of participants’ responses and mitigate the impact of lying.

Another limitation of our study is the assumption of linear relationships between predictors and the outcome variable. Given the unexpected finding that higher pathological selfishness predicted a willingness to reduce consumption, while adaptive and egoistic selfishness did not, it is crucial to consider the possibility of non-linear relationships. Analysis of both first-order and higher-order terms in a non-linear framework, would potentially offer a more nuanced interpretation of the data. Using logistic regression could provide these deeper insights, particularly in relation to non-linear relationships. As such analyses were beyond the scope of the current study, it is recommended that future research addresses these aspects to provide a more comprehensive understanding of the predictors of willingness to reduce consumption.

Furthermore, cross-sectional data does not provide information over time, such as whether the levels of motivation and willingness did lead to a decrease in animal product consumption. There may have been difference in selfishness and motivation depending on the type of animal product if the question on willingness was split into two questions on willingness in relation to meat and non-meat animal products. Possibly providing more accurate data and allow for more effective comparison between the different groups of animal products.

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Declarations

Conflict of Interest The authors declare that they have no conflict of interest.

Ethics Approval Approval was obtained from the Research Ethics Committee of the University of Southern Queensland Human Research Ethics Committee (reference number: H22REA128).

Consent to Participate and to Publish Informed consent was obtained from all participants included in the study to participate and for the results to be published.

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