Changing Misconceptions about Animals - an Intervention to Reduce Speciesism

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Abstract

Underestimating the mental abilities of animals is a key aspect of speciesism which is especially apparent in meat eaters. Since the consumption of meat and other animal products has gravitating consequences for animal welfare, the environment, world hunger, and health, it is important to investigate how to lower speciesist attitudes and animal product consumption. The aim of the study is therefore to test an intervention that addresses common misconceptions about animals' mental abilities in order to lower speciesist attitudes and increase behaviour intentions to harm less animals. A total of 417 participants were recruited using multiple sampling methods. 241 participants who met the inclusion criteria and finished the questionnaire, either watched or did not watch a video that addressed misconceptions about animal abilities. Afterwards, they filled out a speciesist attitudes scale and a scale that measured their intention to change their behaviour towards less animal harm. The findings indicated that there is no significant difference between the intervention and the control condition for both the speciesist attitudes and the behaviour intention scale. Therefore, both hypotheses were rejected. The study highlights the importance of future research in order to investigate more factors like education about the life-stock sector, demographics, and a closer look at how speciesist attitudes develop to find an intervention that can address speciesist attitudes scores and hopefully increase behaviour intentions.

Introduction

People who consume meat often have a lower conception of the mental abilities of animals (Loughnan et al., 2012). The underestimation of the animal mind is a key aspect of speciesism (Caviola, 2019) and often serves as a justification for the different moral treatments of humans and animals (Helton & Helton, 2005). To address the misconceptions and reduce the consumption of animal products, an intervention aimed at informing people about the mental abilities of animals was tested. This study investigates if lowering misconceptions people have about animals can result in a change in attitude towards animals and how we morally treat them. This is especially important since our current consumption of animal products results in negative consequences in terms of animal welfare, our health, the environment, and world hunger.

Theoretical Framework

Consequences of Animal Product Consumption

To understand why effective interventions towards less animal product consumption are necessary, it is important to acknowledge the consequences resulting from the life-stock industry. The market for cheap animal products is bigger than ever which raises the demand for cheap, effective, and excessive farming methods. Approximately 80 million animals are slaughtered per year for the mere purpose of meat production. Most of these animals are kept in tightly controlled factory farms where they live indoors and stand on either cement or wire cages with barely enough room to move (Leighton, 2021).

These procedures not only cause major stress and suffering of these animals but additionally also pose risk to humans. 75% of all emerging diseases are due to zoonotic infections. Zoonoses are infections that are transmitted from animals to humans. Factors like intensive farming, consumption of animal products, and global transportation of animals as

well as the products, contribute to the emergence of these infections (Bengis et al., 2004). Thus, intensive farming is a major health risk for humans.

In addition to health and animal welfare factors, excessive production and consumption also have consequences on the environment. According to Xu et al. (2021), the world's meat sector is responsible for 60% of the food-related CO2 emissions. This contributes to the issue of global warming. Moving towards a more plant-based diet would reduce carbon emissions and increase carbon storage through the reuse of spare land formally used for meat production as its original natural vegetation (Sun et al., 2022)

Finally, meat production and consumption contribute to the suffering of humans since plants are used to feed animals instead of directly nourishing humans. This is problematic since eating plants directly would allow us to use resources more effectively and feed more people. Currently, approximately one billion people suffer from hunger due to the need to feed the animals for meat production instead of directly feeding it to humans. Since there is already excessive farming, the need for responsible management of food resources is crucial to manage the hunger of the one billion people. Only 60% of the farmed plants go to humans directly. Another 35% alone is used to feed the animals for meat production. Therefore, the shift from meat consumption to the consumption of plants directly is one of the major factors when fighting world hunger (Anomaly, 2015).

The Meat Paradox

Despite all these consequences, most people continue to consume meat and other animal products (Godfray et al., 2018). This raises the question of whether most people have sufficient knowledge about the animal product industry. Cornish et al. (2016) investigated the concern and knowledge about animal welfare in developed countries. Findings showed that even if only 12% of European respondents claimed to have "a lot of knowledge" about animal farming in their country, 69% still stated that they have "some knowledge". The study

suggests that the concern for animal welfare is rising. Additionally, Cornish et al. (2016) state, that a concern about animal welfare is linked to more knowledge about such factors. It can therefore be said that even if a lot of people do not feel sufficiently educated about this industry, they still display some knowledge and are aware, that the life-stock industry could be problematic. However, most people still decide to consume animal products.

This knowledge of the negative aspects of animal product consumption while still eating meat often creates negative tension due to conflicting attitudes and behaviours (Loughan et al., 2012). Rothgerber and Rosenfeld (2021) investigated this tension called "meat-related cognitive dissonance" which describes the mismatch between having the attitude of not wanting to hurt animals and still eating meat. To reduce this tension, people use multiple coping strategies like avoidance and ignorance of information about the animal farming industry, distancing themselves from the moral implications (e.g. describing themselves as humane meat eaters), claiming meat is natural and thinking that animals do not feel, think, and suffer the way humans do.

Speciesism

With all those coping mechanisms, people can engage in speciesism. Horta (2010) defines the term as: "Speciesism is the unjustified disadvantageous consideration or treatment of those who are not classified as belonging to one or more particular species.". This means attributing different moral worth on the mere basis of species which results in a moral gulf. This moral gulf is often used as a justification to treat non-human species worse than human ones (Horta, 2010). A core element within speciesism is the underestimation of the animal mind which can be used as a justification for the moral discrepancy between human and animal treatment (Helton & Helton, 2005). To measure this, Caviola (2019) developed a speciesism scale, based on the assumption that speciesists have the attitudes that animals have lower intelligence, sentient, and moral understanding than humans. This speciesism scale was

furthermore used to investigate if speciesism scores can be linked to animal product consumption. Findings suggest that low speciesism scores predict prosocial behaviour towards animals and less consumption of animal products (Caviola, 2019).

Misconceptions

One way to reduce speciesist attitudes could be by alleviating misconceptions people have about animal minds. Especially people who eat meat seem to underestimate the abilities of animals. In comparison to vegetarians, meat eaters display less knowledge and attribute a less complex mind to them (Loughnan et al., 2012). Furthermore, Leach et al. (2023) demonstrated that people misjudge the minds of animals when compared to the knowledge we currently have about them. The study showed that people underestimate the minds of animals, particularly pigs. People tend to underestimate the likeliness of higher mental functioning especially when it comes to empathy, the use of tools to achieve goals, and planning. It can therefore be said that misconceptions and the underestimation of animals are common among most people.

In line with this, recent studies show that in comparison to what most people think, the minds of animals are indeed complex. Inoue and Matsuzawa (2007) showed that chimpanzees might even have a superior working memory in comparison to humans while performing a task of numerical recollection. Not only do chimpanzees show higher cognitive abilities than most people would assume, but pigs can find items in their surroundings after only seeing them through a mirror which displays some level of higher cognition (Broom et al., 2009). Another study showed that pigs can use tools like sticks to dig more efficiently. This is often learned through social interactions with other pigs (Root-Bernstein et al., 2019). Additionally, recent studies suggest that social mammals like pigs use different social strategies like helping one party in a fight but also mediating between the parties afterwards, to resolve conflicts (Cordoni et al., 2022).

In addition to cognitive abilities, also the experience of pain is underestimated. It is hard to investigate this since animals cannot communicate their level of pain. However, the same accounts for infants, and it is still assumed that they feel pain based on the same factors used to analyze the feeling of pain in animals (Owens, 1984). Recent studies show that animals have anatomical, physiological, and behavioural similarities to humans regarding pain and distress experiences (Ferdowsian & Merskin, 2012).

Research Aim and Hypotheses

By now it is clear that misconceptions about animals are widespread. This appears especially among people who eat meat (Loughnan et al., 2012). Those misconceptions are a key belief in speciesism, resulting in superior beliefs of the human species (Helton & Helton, 2005). However, there are no interventions that address this. Interventions to reduce meat consumption usually inform about the negative health aspects of meat consumption, trigger emotions, support competence and training for behaviour change, or increase the visibility of vegetarian food (Kwasny, 2022). Since there is a clear link between the denial of animal minds, speciesist attitudes and animal product consumption, clearing this research gap would be important to find more effective strategies to lower animal product consumption and its consequences. Therefore, this study investigates if an intervention that addresses misconceptions can lower speciesist attitudes and increase the intention to consume animal products.

Based on what was stated before, two expectations can be made about the effect of an intervention that addresses misconceptions about the mental abilities of animals. First, it is hypothesized that *an intervention to clear common misconceptions through informing about the mental abilities of animals should result in lower speciesist attitudes compared with no intervention*.

Since the underestimation of animals seems to be a core factor in speciesism (Horta, 2010).

Second, it is hypothesized that *an intervention that informs about the mental abilities of animals should result in the intention to reduce the hurting of animals compared with no intervention*. This is based on the fact that high speciesist attitudes scores can be linked to increased animal product consumption, and low scores to a bigger likeliness of consuming fewer animal products (Caviola, 2019). Additionally, people are reluctant to harm beings they attribute minds to, leading to a denial of mind as a justification for the consumption of animal products (Rothgerber & Rosenfeld, 2021). Studies show that people who are reminded of animal suffering after they choose to eat meat, are more motivated to deny the minds of animals (Bastian et al., 2012). When people know those misconceptions are not true, they might be more likely to change their behaviour since they can no longer engage in this coping strategy.

Methods

Participants

A total of 417 participants were recruited. From this number, 176 participants were excluded for not meeting the inclusion criteria. Those criteria included completing the questionnaire, being over sixteen, speaking fluent English and giving consent. All data has been collected from 23.04.2024 until 16.05.2024. The final sample comprised 241 participants, consisting of 149 females, 88 males, and 4 non-binary people. The age span of the participants ranged between 16 and 58 years, with a mean age of 23.58 (SD = 8.33). The majority of participants had the nationality of German (N =192, 79.67%) and Dutch (N = 5, 2,07%), the rest of the participants were labeled as others (N = 44, 18.26%). Most participants had the following education levels: primary education (N = 22, 9.13%), secondary education (N = 136, 56.43%), bachelor's degree (N = 54, 22.41%), master's degree (N = 11, 4.56%), and others (N = 17, 7.05%). For employment status, participants were unemployed (N = 130,

53.94%), students (*N* = 86, 35.68%), employed (*N* = 4, 1.66%), self-employed (*N* = 11, 4.56%), retired (*N* = 1, 0.41%) and other (*N* = 9, 3.73%).

The participants were recruited using a mixture of sampling methods. Those were convenience sampling, snowball sampling, and volunteer sampling. For University of Twente students, the study was also published on SONA where they could get 0.25 credits for their participation. All participants had the chance to win a fifty-euro gift voucher.

Procedure & Materials

Before the data collection, ethical approval by the ethics board of the University of Twente was acquired to ensure the well-being of the participants. This study utilized a quantitative, between-participant design. The participants were evenly distributed in either the intervention or control group. Both groups should complete an online survey completed in Qualtrics where they first got presented an informed consent and an overview of the study. Here, the set-up, aim, and purpose of the study were explained, along with the information that participation was voluntary. Additionally, a trigger warning due to the possible display of how animals are treated was provided. All the participants first filled out the demographic data containing gender, nationality, age, the highest level of education, and employment status. They were then asked to state if they are currently vegan, vegetarian, pescetarian, or omnivore.

Then, participants were randomly assigned to either the intervention or no intervention condition. For the intervention condition, a video that first showed how animals are treated and then addressed the mental abilities of animals was shown. The video included frequencies of animals with an explanation of scientific evidence. Additionally, the video included a memory test where the participants could compare their outcomes to those of a chimpanzee. The video ended with an appeal to end animal suffering by showing plant-based options and raising the question "What can you do to prevent animals from suffering?" for the viewer

(https://www.youtube.com/watch?v=-EbfNqRoGzo&t=3s). Participants in the control condition did not watch the video and did not get another task. Afterwards, participants in both conditions were provided with a questionnaire measuring speciesist attitudes by Caviola (2019).

Speciesist attitudes were measured with six items. Participants indicated how much they agreed with statements like: "Morally, animals always count for less than humans." on a scale from 1 to 5 ranging from strongly disagree to strongly agree (see Appendix A). All the participants then moved on to fill in a behaviour intention scale that measures participants intentions to reduce the hurting of animals (see Appendix B). This scale contained 10 items like "*I intend to eat meat…"* The participants could choose between five possible answers: "*More than I currently do, just as much as I currently do, less than I currently do, stop consuming all together, I did not consume meat and I would stick to that*". This was also done with statements about dairy, egg, fur, feather, wool, leather, and animal-tested cosmetic products. Furthermore, the scale asked if participants would visit the zoo or a circus where animals are used for entertainment. Afterwards, the participants in the intervention condition stated if they watched the video to the end (yes/no) and how much attention they paid to it (on a scale from one to seven). All of the participants later had the opportunity to give additional remarks. Last, the participants were thanked and debriefed. The survey also had questions that measured empathy levels and how many misconceptions participants still held after the video were presented. However, those were objectives for another study and will not be discussed further. The participants were able to win the gift voucher by participating in a raffle that was presented to them in a different form after the intervention. This ensured that the voluntary mail given by the participants could not be linked to the answers given in the questionnaire to respect their privacy.

Cronbach´s alpha A reliability analysis was conducted using Cronbach's alpha coefficient. For the Speciesist attitude scale, Cronbach's alpha indicates an acceptable level of internal consistency (α = .73). For the Behaviour intention scale, Cronbach´s alpha also showed an acceptable level of internal consistency (α = .78).

Results

Descriptive Statistics

In order to gain a general understanding of the data, the mean and standard deviations for the control and the intervention conditions are reported for both the speciesist attitudes and the behavioural intention scale (Table 1).

Table 1

Mean and standard deviation of speciesist attitudes and behaviour intention scales in the control condition and intervention condition.

	Control		Intervention	
Dependent Variable	*M*	*SD*	*M*	*SD*
Speciesist attitudes	2.02	1.23	2.05	1.18
Behavioural Intention	3.35	1.27	3.43	1.27

Hypothesis Testing

The first hypothesis was: *an intervention to clear common misconceptions through informing about the mental abilities of animals should result in lower speciesist attitudes compared with no intervention*. To measure this, a t-test was conducted which compared the differences between the intervention and control condition on speciesist attitudes. The intervention condition (M = 2.02, SD = 1.23) compared to the control condition (M = 2.05,

SD = 1.18) did not show a significant effect $t(238) = -0.007$, $p = .943$. The Hypothesis was therefore rejected.

The second hypothesis was: *an intervention that informs about the mental abilities of animals should result in the intention to reduce the hurting of animals compared with no intervention*. Again, a t-test was run to test if there was a significant difference between both conditions on behaviour intentions to reduce animal harm. When compared with the control condition ($M = 3.35$, $SD = 1.27$), the intervention condition ($M = 3.43$, $SD = 1.27$) did not show a significant difference $t(231) = 1.12$, $p = .264$. The hypothesis was therefore rejected.

It was tested if taking out participants who did not watch the video to the end would make an effect. For that, all the participants who stated that they did not watch the full video were taken out. However when compared with the control condition it can be seen that it did not change the results for the speciesist attitudes scale $t(78) = 0.537$, $p = .593$ and the behaviour intention scale $t(78) = -0.121$, $p = .272$.

Additional Analyses

The speciesist attitudes and the behavioural intention scales showed a high negative correlation to each other ($r = -0.59$). This indicates that people who score higher on speciesist attitudes, show less behavioural intentions.

Discussion

Animal product consumption is the root of many problems humanity must face. Despite consequences like global warming, world hunger, human health, and animal cruelty, many people still consume meat and other animal products. One way to justify consumption is through denying the mind of animals (Rothgerber & Rosenfeld, 2021). Misconceptions about animals are a core tenet within the construct of speciesism (Horta, 2010). Nowadays research shows that in comparison to what many people think, animals are capable of complex emotions and cognitions (Leach et al., 2023) Hence, this research investigated

whether correcting misconceptions about the mental abilities of animals could lower speciesist attitudes scores and increase behavioural intention towards less animal product consumption. First, the speciesist attitudes scores were accessed, and the effect of an intervention was measured. For the first Hypothesis, findings suggested that there was no difference through the intervention since participants who received the intervention did not score differently on the speciesist attitudes scale than the control group.

For the second hypothesis, behaviour intentions towards less animal product consumption were measured. Caviola (2019) showed that participants who scored low on the speciesist attitudes scale are more likely to consume fewer animal products. Additionally, the denial of the animal is often used as a coping strategy to avoid the feeling of meat-related cognitive dissonance (Rothgerber & Rosenfeld, 2021). It was therefore assumed, that through educating about the actual mental abilities of animals, participants should be less likely to be speciesist and therefore also intend to consume less animal products. Again, the analysis did not show that the intervention increased the intention to consume less animal products. Since both hypotheses were not confirmed, it is therefore important to see which factors may have contributed to that.

Explaining Findings

In order to understand the findings, it is necessary to retake a look at the studies the hypotheses were based on. Caviola (2019) developed and tested the speciesist attitudes scale used in this study. When looking at the outcomes in terms of the speciesist attitudes scale itself, it can be seen, that on average the participants in Caviola's study scored higher than in this study. In Caviola's study, the mean for the speciesist attitudes score was 3.64 (*SD* = 1.25) while in this study the mean for the control condition was 2.02 (*SD* = 1.23) and for the intervention condition 2.05 (*SD* = 1.18). The average speciesist attitudes score within this

study could therefore be considered low. If the speciesist attitudes score is small, to begin with, it could be the case that an intervention to reduce it even further might not be possible.

Not only for the first but also for the second hypothesis the low speciesist attitudes scores could be a reason for the insignificant effect of the intervention on behaviour intention scores. The assumption that the intervention not only lowers speciesist attitudes but also increases behaviour intentions towards less animal product consumption was based on the fact that people with less speciesist attitudes are more likely to be vegetarian (Caviola, 2019). Again, an intervention that increases behaviour intentions through lowering speciesist attitudes scores might not be possible when speciesist attitudes scores are low to begin with.

It is also important to note, that people in both groups scored relatively high on the behaviour intention score and in general intend to change their behaviour. For the intervention group, the mean score was 3.43 (*SD* = 1.27) and for the control group, the mean was 3.35 (*SD* = 1.27). Indicating that most people already intend to consume less animal products.

Influence of Demographics on Speciesist Attitudes Scores

But why are speciesist attitudes scores within this study small when compared to other studies? In order to explain this it is necessary to see if there could be other factors that influence speciesist attitudes scores. Knight et al. (2004) investigated if the belief in animal minds influences opinions towards animal use. The study furthermore investigated factors like age and gender. Findings showed that the belief in the animal mind especially in young women predicts more concern for animal welfare. Since the sample in the current study consisted mainly of young women, it could be a reason why they are already more likely to believe in the minds of animals and because of that already have some concern for animal welfare. This could be one explanation for the low speciesist attitudes scores.

Educational Interventions and Cognitive Dissonance

However, not only the sample could account for the insignificance of the findings. Banach and Stel (2024) also tested an intervention that intended to reduce speciesist attitudes scores in order to increase the intention to change behaviour. Within this study, also a sample dominated by young women was used. Similar to this study, the intervention used by Banach and Stel did not affect speciesist attitudes scores. However, it indeed affected behaviour intention scores. Within two studies that both accessed behaviour intentions, people were more likely to state that they intend to change their behaviour in order to reduce animal cruelty. In the study by Banach and Stel (2024), the intervention consisted of a video that showed a parallel world in which humans and animals switched roles. The intervention used perspective-taking and education to increase behaviour intention instead of clearing up misconceptions. However, awareness about the treatment of animals did not seem to influence the behaviour intention scores, making it debatable if education played a role in this particular study.

Nevertheless, education might still play a role in both speciesist attitudes and behaviour intention scores. As already stated in the introduction, most people only claim to have "some knowledge" about farming methods (Cornish et al., 2016). Additionally, people tend to have misconceptions about farming and do not display sufficient factual knowledge (Clark et al., 2016). For many meat eaters, gaining information about the life-stock sector raises the uncomfortable feeling of cognitive dissonance since they are reminded that their belief to not harm animals is not in alignment with their actions (Rothgerber & Rosenfeld, 2021). To avoid this feeling, they avoid further information or deny the mind of animals to justify the difference in human and animal moral treatment (Helton & Helton, 2005). In this case, having sufficient knowledge about the livestock industry might be a prerequisite for developing cognitive dissonance and through the denial of the animal mind, acquiring speciesist attitudes to cope with it. In addition, being educated on the life-stock sector might

be a prerequisite to acknowledging why the industry is problematic and why behavioural change is important. Within this intervention, the first few seconds showed some images of how animals were treated, but the main focus was on clearing misconceptions instead of educating about the farming industry.

Animal-Specific Speciesist Attitudes

Apart from the possible lack of education about farming methods among participants, it is important to acknowledge, that speciesism does not only distinguish between the moral worth of humans and animals but distinguishes between different animals as well. Marriot and Cassaday (2022) investigated the attribution of emotional appeal and mind among different animals. To assess this, speciesist attitudes were measured for different animals. The findings showed that people indeed differentiate between animals. People attributed less mind to animals used in production and therefore showed more speciesist attitudes and less concern for their welfare. In this intervention, only cows, crabs, chimpanzees, chickens and pigs were addressed. Furthermore, within the remarks section people stated that they had issues making general statements about animals "Perhaps the use of the word 'animal' is too vague, given that across the animal kingdom there is great variety among capacities/lived experiences" and "I do believe depending on the species, some will be more capable than others to have a deeper ability for these". Since speciesist attitudes seem to be animal-specific it might be important to measure if the animal-specific attributions of mind have changed instead of making general statements about animals.

Limitations

When looking at the findings it is important to take limitations into account. First, the sample mainly consisted of young Western women and therefore only presented a certain group of people. This should be considered when generalizing the findings to a bigger population, especially since these factors can influence speciesist attitudes scores. It could

also be the case that people did not answer the scales truthfully. Since both speciesist attitudes and behavioural intentions are moral topics, people might answer in a way that makes them look better instead of the truth. Besides that, only behaviour intentions and not actual behaviour change were measured. Behaviour intentions are often higher than actual behaviour change (Webb & Sheeran, 2006). Again, especially for behaviour intentions towards less meat consumption, many people might indicate that they intend to change their behaviour because they acknowledge that harming animals is wrong. However, actual behaviour change is probably less likely.

Future implications and suggestions

Even if the intervention did not show the assumed effects, the study still adds value since no study investigates the effects of an intervention that specifically addresses misconceptions in order to lower speciesist attitudes. That the underestimation of animal minds plays a role in speciesism is however clear. To further investigate this, it might be helpful to take some things into account for future research.

That speciesism and the denial of the mind of animals are related was already made clear within other studies, but how is still not clear. The study by Rothgerber and Rosenfeld (2021) showed that denying the minds of animals is a method to cope with meat-related cognitive dissonance. In other studies, speciesism, and the denial of minds in animals is more a construct itself that highly correlates to other constructs like the social dominance theory (Caviola, 2019), rather than a coping strategy. It is therefore important to further investigate if speciesist attitudes is a coping method, a construct itself or both since different causes might require different interventions.

Besides the unclarity of how speciesism develops it is also important that speciesist attitudes seem to have multiple factors that influence it. As already stated, young females are probably less likely to score high on speciesist attitudes. A more diverse sample in terms of

age and gender could therefore be helpful. Through that, a sample with more variation in scores that potentially scores higher on speciesist attitudes could be acquired. This is of particular importance since an intervention against speciesist attitudes can only work on people who have speciesist attitudes to begin with.

In addition to the demographic factors that seem to influence speciesist attitudes, also knowledge about farming methods seems to play a role in the development of speciesist attitudes. Being educated on the life stock industry might be necessary to acknowledge the importance of behaviour change. Therefore, an intervention that also educates about the life stock sector might be more successful than addressing misconceptions alone.

Furthermore, speciesist attitudes often concern specific animals since people tend to attribute different mental abilities to different animals. It therefore might be more helpful to see how speciesist attitudes scores change for the specific animals addressed in the intervention than for all animals in general.

Last, it is important to acknowledge that it was not directly excessed if the misconceptions people had, were lowered through the intervention. It could therefore be beneficial to investigate this more explicitly in future research.

To summarise, the construct of speciesism, how people gain speciesist attitudes, and which factors play a role are still unclear. Additional measures like animal-specific speciesist attitudes and misconceptions resolved in the video could also help in understanding the effects of an intervention. More research to clear those questions in order to develop an intervention would be needed.

Conclusion

This study investigated the effect of an intervention on speciesist attitudes and behavioural intentions. Even if the study did not show the expected results, it still provided valuable insights for an important theme. It might be essential to provide a clearer explanation

of how speciesism is developed and to investigate if it is a coping mechanism, a moral construct, or both. Factors like demographic values as well as educational factors should be included in future research. Also, additional measures like animal-specific speciesist attitudes and the effect of the intervention on the misconceptions addressed in the video could generate valuable insight. Despite the difficulties with the overall low speciesist attitudes scores in the context of this study it might be important to say that low scores are still good since they show that at least in this sample, people do believe in the equality of animals. The same accounts for the behavioural intentions which were high in general, showing that many people already intend to change their behaviour. Despite the insignificant findings, the study still provides a good base and suggestions for future research in this direction.

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Appendix

Appendix A

Speciesism scale

Q37

In the following statements about animals are shown, please indicate how much you disagree/agree for every statement.

	strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Morally, animals always count for less than humans.	○	○	○	○	○
Chimpanzees should have basic legal rights such as a right to life or a prohibition of torture.	○	○	○	○	○
Humans have the right to use animals however they want to.	○	○	○	○	○
It is morally acceptable to keep animals in circuses for human entertainment.	○	○	○	○	○
It is morally acceptable to trade animals like possessions.	○	○	○	○	○
It is morally acceptable to perform medical experiments on animals that we would not perform on any human.	○	○	○	○	○

Appendix B

Behaviour Intention scale

UNIVERSITY OF TWENTE.

Now we would like to ask you about your intentions for future behaviour as compared to your past behaviour.

I intend to consume meat...

more than I currently do	just as much as I currently do	less than I currently do	stop consume all together	I did not consume meat and I would stick to that
○	○	○	○	○

I intend to consume dairy products (e.g., milk, cheese) ...

more than I currently do	just as much as I currently do	less than I currently do	stop consume all together	I did not consume dairy products and I would stick to that
○	○	○	○	○

I intend to consume eggs...

more than I currently do	just as much as I currently do	less than I currently do	stop consume all together	I did not consume eggs and I would stick to that
○	○	○	○	○

I intend to buy fur, down, feather, and wool products (e.g., coats, pillows, duvets, sweaters for which animal products are used)...

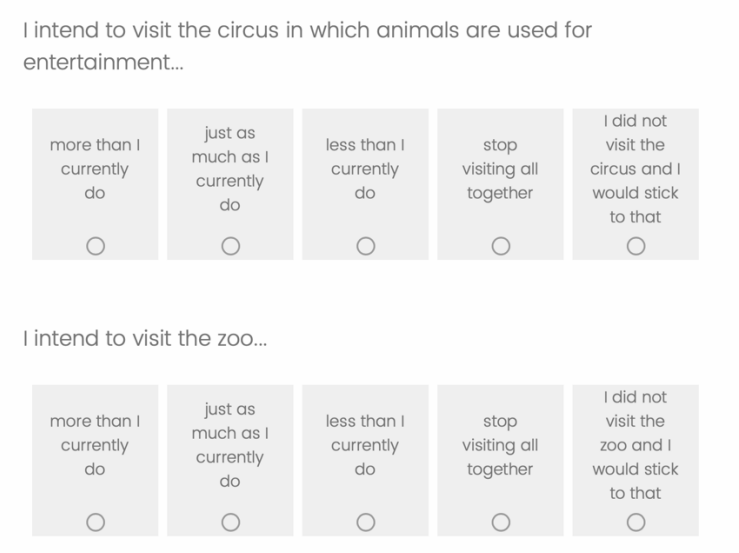
more than I currently do	just as much as I currently do	less than I currently do	stop buying all together	I did not buy these products as I actively check this and I would stick to that
○	○	○	○	○

I intend to buy leather products (e.g., shoes, jackets, purses, furniture for which leather is used)...

more than I currently do	just as much as I currently do	less than I currently do	stop buying all together	I did not buy leather products as I actively checked this and I would stick to that
○	○	○	○	○

I intend to buy cosmetic products for which animals were tested on...

more than I currently do	just as much as I currently do	less than I currently do	stop buying all together	I did not buy cosmetic products for which animals were tested on and actively checked this and I would stick to that
○	○	○	○	○



Appendix C

R code

```
#load libraries
install.packages("psychotools")
library(psych)
library(tidyverse)
library(psychTools)
library(dplyr)
library(janitor)
library(tidyr)
library('CTT')
library(ggplot2)
```

```
library(readxl)

data <- read.csv('changingfinal numeric.csv')
df <- data
df <- df[c(1:51,77:78)] #This selects the collumns you want to use

df <- df[-
c(1:14,41,42,67,78,81,248,257,264,84,294,275,150,151,152,153,155,156,157,158,161,162,163,164,165,167,168,169,171,172,175,177,178,179,180,182,183,184,185,186,188,189,190,192,193,194,198,199,200,202,204,205,206,207,208,210,211,213,217,218,219,220,221,222,224,225,226,227,228,229,230,233,234,236,237,250,295,298,299,300,304,308,309,310,312,313,314,317,319,320,321,322,323,324,325,326,330,331,332,334,335,336,338,339,340,342,344,345,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,363,364,365,366,367,370,371,372,376,377,382,384,385,388,389,390,391,392,393,396,398,399,400,401,402,403,404,407,409,410,411,412,413,414,415,416,418),]
#This deletes all the variables that you do not need
df <- df[ , ! names(df) %in% c("Sona.ID", "StartDate","EndDate", "RecipientFirstName", "RecipientLastName", "RecipientEmail", "ExternalReference", "IPAddress", "Status", "RecordedDate", "ResponseId", "LocationLatitude", "LocationLongitude", "DistributionChannel", "UserLanguage")]



#Now we make the values that we want to use numeric for speciesism
df$Q37_1 <- as.numeric(df$Q37_1)
df$Q37_2 <- as.numeric(df$Q37_2)
df$Q37_3 <- as.numeric(df$Q37_3)
df$Q37_4 <- as.numeric(df$Q37_4)
df$Q37_5 <- as.numeric(df$Q37_5)
df$Q37_6 <- as.numeric(df$Q37_6) #you also need to do this for the BI variables but I think you should be able to do this yourself :)

#make the values numeric for behaviour intentions
df$BI1 <- as.numeric(df$BI1)
```

```
df$BI2 <- as.numeric(df$BI2)
df$BI3 <- as.numeric(df$BI3)
df$BI4 <- as.numeric(df$BI4)
df$BI5 <- as.numeric(df$BI5)
df$BI6 <- as.numeric(df$BI6)
df$BI7 <- as.numeric(df$BI7)
df$BI8 <- as.numeric(df$BI8)
df$BI9 <- as.numeric(df$BI9)

#make attention to video numeric
df$Videoattent <- as.numeric(df$Videoattent)
df$Videotoend <- as.numeric(df$Videotoend)



# Find the maximum value in Q37_2
max_value <- max(df$Q37_2)
max_value <- max(df$Q37_2, na.rm = TRUE)
# Revert the values in Q37_2
df$Q37_2<- max_value + 1 - df$Q37_2
df <- df[df$Age >= 16,]

#distinct intervention vs control gorup
df$condition <- ifelse(df$Q76_First.Click !=
                         "", "Intervention", "Control")

#demographics
# Calculate counts of each gender category
gender_counts <- table(df$Gender)

# Print the counts
print(gender_counts)
# Find the minimum and maximum ages
min_age <- min(df$Age, na.rm = TRUE)
max_age <- max(df$Age, na.rm = TRUE)
```

```
# Convert Age column to numeric
df$Age <- as.numeric(df$Age)
# Calculate the mean age
mean_age <- mean(df$Age, na.rm = TRUE)

# Print the mean age and SD
cat("Mean age:", mean_age, "\n")
age_sd <- sd(df$Age, na.rm = TRUE)
# Print the standard deviation
cat("Standard deviation of age:", age_sd, "\n")

# Calculate counts of each nationality category
nationality_counts <- table(df$Nationality)

# Print the counts
print(nationality_counts)

# Calculate percentages
nationality_percentages <- prop.table(nationality_counts) * 100

# Print the percentages
print(nationality_percentages)
#Now we can start with the real data analysis: DO NOT RERUN THE CODE ABOVE!!! IF YOU DO SO RERUN EVERYTHING AND NOT JUST SINGLE LINES! This is important otherwise your dataset will be fucked!

# Calculate counts of each education level category
education_counts <- table(df$Education)

# Print the counts
print(education_counts)

# Calculate percentages
education_percentages <- prop.table(education_counts) * 100
```

```
# Print the percentages
print(education_percentages)

#employment

employment_counts <- table(df$Employment)

# Print the counts
print(employment_counts)

# Calculate percentages
employment_percentages <- prop.table(employment_counts) * 100

# Print the percentages
print(employment_percentages)

#neue variable für condition
df$condition <- ifelse(df$Q76_First.Click !=
                       "", "Intervention", "Control")

#For creating a new variable e.g. if you want to have the mean of a set of items you can simply use "df$x <- mean(df[collumns of items you want to calculate]) x will be the new variable name
df$mean_Q <- rowMeans(df[c(23:28)]) #with this you create a new variable for the mean of items in collumns 21 till 26#
df$BI_mean <- rowMeans(df[c(29:37)])
control_data <- df[df$condition == "Control", ]
#hier na werte raus



# Calculate the mean speciesism score for all participants in the control group combined
```

```
control_data$Q_mean <- rowMeans(control_data[, c("Q37_1", "Q37_2", "Q37_3", "Q37_4",
"Q37_5", "Q37_6")])
control_data$Q_mean <- rowMeans(control_data[, c("Q37_1", "Q37_2", "Q37_3", "Q37_4",
"Q37_5", "Q37_6")], na.rm = TRUE)
# Print the mean speciesism score for the control group
print(control_data$Q_mean)
mean(control_data$Q_mean)


sd_speciesism_control <- sd(unlist(control_data[, c("Q37_1", "Q37_2", "Q37_3", "Q37_4",
"Q37_5", "Q37_6")]), na.rm = TRUE)

# Print the standard deviation of the speciesism scores for the control group
print(sd_speciesism_control)

# Calculate the mean of the behavior intention scale for the control group combined
control_data$BI_mean <- (rowMeans(control_data[, c("BI1", "BI2", "BI3", "BI4", "BI5",
"BI6", "BI7", "BI8", "BI9")], na.rm = TRUE))
mean(control_data$BI_mean)
# Calculate the standard deviation of the behavior intention scale for the control group
combined
sd_bi_control <- sd(unlist(control_data[, c("BI1", "BI2", "BI3", "BI4", "BI5", "BI6", "BI7",
"BI8", "BI9")]), na.rm = TRUE)

# Print the mean and standard deviation of the behavior intention scale for the control group
print(control_data$BI_mean)
print(sd_bi_control)

# Calculate the mean speciesism score for each participant in the control group
mean_speciesism <- rowMeans(control_data[, c("Q37_1", "Q37_2", "Q37_3", "Q37_4",
"Q37_5", "Q37_6")], na.rm = TRUE)

# Calculate the mean behavior intention score for each participant in the control group
```

```
mean_behavior_intention <- rowMeans(control_data[, c("BI1", "BI2", "BI3", "BI4", "BI5",
"BI6", "BI7", "BI8", "BI9")], na.rm = TRUE)

#raus mit naomit shit
control_data<- control_data[, !names(control_data) %in%
c("Q37_2_reverted","Videoattent","Videotoend")]
control_data<-na.omit(control_data)
# Calculate the correlation between the mean speciesism score and the mean behavior
intention score for the control group
correlation_control <- cor(control_data$BI_mean,control_data$Q_mean)

# Print the correlation between the mean scores of the two scales for the control group
print(correlation_control)

# Subset the data for participants in the intervention condition
intervention_data <- df[df$condition == "Intervention", ]
intervention_data<- intervention_data[, !names(intervention_data) %in%
c("Q37_2_reverted")]

#aus irgendeinem grund ist da na drin deswegen löschen
intervention_data <- na.omit(intervention_data)
control_data <- na.omit(control_data)

# Calculate the mean speciesism score for each participant in the intervention group
intervention_data$Q_mean <- rowMeans(intervention_data[, c("Q37_1", "Q37_2", "Q37_3",
"Q37_4", "Q37_5", "Q37_6")], na.rm = TRUE)
mean(intervention_data$Q_mean)
df$Q_mean<-rowMeans(df[, c("Q37_1", "Q37_2", "Q37_3", "Q37_4", "Q37_5", "Q37_6")],
na.rm = TRUE)
# Calculate the mean behavior intention score for each participant in the intervention group
intervention_data$BI_mean <- rowMeans(intervention_data[, c("BI1", "BI2", "BI3", "BI4",
"BI5", "BI6", "BI7", "BI8", "BI9")], na.rm = TRUE)
mean(intervention_data$BI_mean)
# Calculate the standard deviation of the speciesism scores for the intervention group
```

```
sd_speciesism_intervention <- sd(unlist(intervention_data[, c("Q37_1", "Q37_2", "Q37_3",
"Q37_4", "Q37_5", "Q37_6")]), na.rm = TRUE)
print(sd_speciesism_intervention)
# Calculate the standard deviation of the behavior intention scores for the intervention group
sd_behavior_intention_intervention <- sd(unlist(intervention_data[, c("BI1", "BI2", "BI3",
"BI4", "BI5", "BI6", "BI7", "BI8", "BI9")]), na.rm = TRUE)
print(sd_behavior_intention_intervention)
# Calculate the correlation between the mean speciesism score and the mean behavior
intention score for the intervention group
correlation_intervention <- cor(Q_mean,BI_mean)
print(correlation_intervention)
cori <- cor(Q_mean,BI_mean)
# Print the mean, standard deviation, and correlation for the intervention condition
print("Mean speciesism score for intervention:")
print(mean(mean_speciesism_intervention))
print("Mean behavior intention score for intervention:")
print(mean(mean_behavior_intention_intervention))
print("Standard deviation of speciesism score for intervention:")
print(sd_speciesism_intervention)
print("Standard deviation of behavior intention score for intervention:")
print(sd_behavior_intention_intervention)
print("Correlation between speciesism and behavior intention for intervention:")
print(correlation_intervention)

# Calculate the mean attention score for the intervention group
mean_attention_intervention <- rowMeans(intervention_data[, c("Videoattent",
"Videotoend")], na.rm = TRUE)

# Print the mean attention score for the intervention condition
print("Mean attention score for intervention:")
print(mean(mean_attention_intervention))

## Calculate the standard deviation of the attention scores for the intervention group
```

```
sd_attention_intervention <- sd(unlist(intervention_data[, c("Videoattent", "Videotoend")]), na.rm = TRUE)

# Print the standard deviation of the attention scores for the intervention condition
print("Standard deviation of attention score for intervention:")
print(sd_attention_intervention)
#calculating mean variables for both questionaires
df$Q_mean <- rowMeans(df[c(23:28)])
df$BI_mean <- rowMeans(df[c(29:37)])

#analysis
out <- lm(mean ~ condition, data = df)
anova(out) #with this you test wether there is a significant difference between control and intervention group for the first questionaire
summary(out)
out <- lm(BI_mean ~ condition, data = df)
anova(out) #with this you test wether there is a significant difference between control and intervention group for the first questionaire
summary(out)
out <- lm(BI_mean ~ Q_mean * condition, data = df)
summary(out)

#neuer anova try für spe
# Renaming 'mean' to 'mean_score'
df$mean_score <- df$Q_mean

# Führe die lineare Regression durch
out <- lm(mean_score ~ condition, data = df)

# Führe die ANOVA durch, um die Signifikanz zu testen
anova_out <- anova(out)

# Ergebnisse anzeigen
print(anova_out)
```

```
#alpha

psych::alpha(df[c(23:28)]) #Alpha for specimen
psych::alpha(df[c(29:37)]) #Alpha for BI scale

#employment
# Count values for each employment category
employment_counts <- table(df$Employment)

# Display the counts
print(employment_counts)

data <- read.csv('changingfinal numeric.csv')

#videotoend 2,3 raus! und videoattend 1,2,3 raus
# Filtere die Daten, um nur die Intervention-Bedingung zu behalten
# Angenommen, die Bedingungsspalte heißt "Condition" und die Intervention-Bedingung ist
mit "Intervention" gekennzeichnet
intervention_data2 <- subset(df, condition == "Intervention")

# Alternativ, falls du mit dem gefilterten Dataset weiterarbeiten möchtest, kannst du es
einfach in einer neuen Variablen speichern

#lösche dumme variable reverted



intervention_data2<- intervention_data2[, !names(intervention_data2) %in%
c("Q37_2_reverted")]
intervention_data2 <- intervention_data2[intervention_data2$Videotoend == 1,]
#aus irgendeinem grund ist da na drin deswegen löschen
intervention_data2 <- na.omit(intervention_data2)
```

```
#speciesism and bI scores für dieses dataset vs normal intervention condition

#hab jetzt mean ins data dings gebracht
intervention_data2$Q_mean <- rowMeans(intervention_data2[c(23:28)])
intervention_data2$BI_mean <- rowMeans(intervention_data2[c(29:37)])

#mache mean vom mean
mean(intervention_data2$Q_mean)
mean(intervention_data2$BI_mean)
#vergleiche leute in intervention mit dummy variable und signifi
#newdataset
#hat intervention was gebracht(mit allen leuten drin)
out <- lm(df$BI_mean ~ df$condition)
summary(out)

#gucke ob control und data2 signifikant ist oder nicht und
out <- lm(intervention_data$BI_mean ~ intervention_data$videotoend)
summary(out)
#net signifikant

out <- lm(intervention_data$Q_mean ~ intervention_data$videotoend)
summary(out)

#check ob control und intervention2 significant ist

t.test(control_data$BI_mean, intervention_data2$BI_mean) #t.test for BI mean
t.test(control_data$Q_mean, intervention_data2$Q_mean) #t.test for BI mean
#code ging gerade nicht für anova deswegen hier neuer versuch
# Führe ANOVA durch, um Unterschiede zwischen den Gruppen zu analysieren
# Speciesism
anova_speciesism <- aov(Q_mean ~ condition, data = df)
summary(anova_speciesism)
```

```
# Speciesism
anova_behaviourintention <- aov(BI_mean ~ condition, data = df)
summary(anova_behaviourintention)



#nimm alle außer die omnivoren raus
omnivore_data<- subset(df)
omnivore_data<- omnivore_data[, !names(omnivore_data) %in% c("Q37_2_reverted")]
omnivore_data <- omnivore_data[omnivore_data$Q33 == 4,]
#aus irgendeinem grund ist da na drin deswegen löschen
omnivore_data <- na.omit(omnivore_data)

#lösche naomit shit
omnivore_data<- omnivore_data[, !names(omnivore_data) %in%
c("Q37_2_reverted","Videoattent","Videotoend")]
omnivore_data<-na.omit(omnivore_data)
#means and shit

omnivore_data <- rowMeans(omnivore_data)[, c("Q37_1", "Q37_2", "Q37_3", "Q37_4",
"Q37_5", "Q37_6")], na.rm = TRUE)
# Print the mean speciesism score for the control group
print(control_data$Q_mean)
mean(control_data$Q_mean)
#speciesism and bI scores für dieses dataset vs normal intervention condition

# Create the speciesism and behavioral intention scale scores
omnivore_data <- omnivore_data %>%
  mutate(
    Speciesism_Score = rowMeans(select(., Q37_1:Q37_6), na.rm = TRUE),
    Behavioral_Intention_Score = rowMeans(select(., BI1:BI9), na.rm = TRUE)
  )

# Calculate the means for each condition for both scales
```

```
mean_scores <- omnivore_data %>%
  group_by(condition) %>%
  summarise(
    mean_speciesism = mean(Speciesism_Score, na.rm = TRUE),
    mean_behavioral_intention = mean(Behavioral_Intention_Score, na.rm = TRUE)
  )

# Print the result
print(mean_scores)

control_data$Q_mean <- rowMeans(control_data[, c("Q37_1", "Q37_2", "Q37_3", "Q37_4",
"Q37_5", "Q37_6")])

df$mean_Q <- rowMeans(df[c(23:28)])

df$mean_BI <- rowMeans(df[c(29:37)])

cor.test(df$mean_BI, df$mean_Q)
```