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The influence of cognitive dissonance on the intention to reduce meat consumption

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Abstract

Climate change currently poses a large global challenge, and, it is undeniable that meat production and consumption play a significant role in this challenge. Reducing meat consumption could reduce the consequences of the meat industry on the climate. Currently, behavioral insights are emerging as a policy tool, and, this can be used in reducing meat consumption. In recent literature, the cognitive dissonance theory has emerged as a way to influence the meat consumption behavior of consumers. This research builds upon that theory, by making people aware of the discrepancy between their animal welfare values and their behavior adhering to those values, in both a social and non-social context. Using ANOVA analyses, a strong positive relationship between cognitive dissonance and intention to reduce meat consumption was found. Gender, pro-environmental self-identity, and self-integrity also appeared to have a positive relationship with the intention to reduce meat consumption. The intervention effectively aroused cognitive dissonance, which had a positive relationship with the intention to reduce meat consumption. Thus, cautiously can be concluded that the intervention results in an increased intention to reduce meat consumption, through dissonance.

Keywords: Meat paradox, cognitive dissonance, hypocrisy paradigm, self-integrity, pro-environmental self-identity, animal welfare, social context

Contents

1. Introduction

In the current society, it becomes increasingly normal to reduce meat consumption and start eating vegetarian. This is a welcome development since the meat industry is one of the industries in the food sector with the largest impact on the environment (Djekic, 2015; Jalil, Tasoff & Bustamante, 2020; Bouwman, Bolderdijk, Onwezen, & Taufik, 2022; Macdiarmid, Douglas & Campbell, 2016). Livestock, including meat production, is responsible for even more global greenhouse gas emissions than the transport sector (Schenk et al., 2018). However, currently, there is little public awareness about the role of livestock on climate change (Jalil et al., 2020; Macdiarmid et al., 2016). People are unaware of the consequences the meat industry brings to the environment.

At the same time, there are concerns about animal welfare in the meat industry (Verbeke & Viaene, 2000). In general, people tend to underestimate the extent of the pain endured by animals (Rothgerber, 2020). Animals are, for instance, being slaughtered without getting stunned on the forehand (Grandin, 2014). While eating meat contributes to both harming the environment and animal welfare, people keep consuming meat. Bringing meat consumption down could impose large benefits on society. According to the Paris Agreement, greenhouse gas emissions must decline by 43% by 2030 (United Nations, 2015). However, given our present attitude towards the environment, it takes a while before that objective can be achieved if it even can be. Reducing meat consumption could play a significant role in reducing greenhouse gas emissions, since 35% of world emissions are believed to be caused by agriculture and land use for livestock (Yip, Crane & Karnon, 2013; McMichael, Powles, Butler & Uauy, 2007). Yip et al. (2013) found that reducing meat consumption has the potential to yield emission benefits, and thus can help reach the goals stated by the Paris Agreement.

A theory that could be used to tackle these societal challenges is the cognitive dissonance theory. According to the cognitive dissonance theory, people feel uncomfortable or dissonant when their ideas or values do not match their actions. Considering meat consumption, the meat paradox is a perfect example. The meat paradox entails that people respect the lives of animals, but simultaneously enjoy eating meat. This leads to a situation where their values are not resonant with their behavior. Implementing this theory could be done by making people consider how their meat intake may go against their moral convictions regarding animal welfare and environmental sustainability, eventually changing their intentions regarding meat consumption. This theory can be used since there is a lot of evidence that individuals are very much conflicted when it comes to eating animals, because of how frequently their behavior and expressed attitude toward animals diverge (Rothgerber & Rosenfeld, 2021). An example of how this theory could be implemented is by making people aware of the discrepancy between their beliefs and behavior. Using an intervention to make people aware of this discrepancy can especially be used in specific settings where people support a certain goal, but do not behave consistently with those beliefs (Dickerson Thibodeau, Aronson & Miller, 1992).

This research, therefore, investigates the following research question: What is the effect of a cognitive dissonance intervention on the intention to reduce meat consumption among students, in both social and non-social contexts? By investigating this question, this research aims to add to the existing literature on cognitive dissonance. First of all, because there is limited research of the effect of cognitive dissonance interventions on the intention to reduce meat consumption. Additionally, Experimental research is limited, and, more experimental research is needed on testing the effectiveness of values and message framing on the reduction of meat consumption (Harguess, Crespo & Hong, 2020). Also, there are few empirical studies that use a direct measurement of cognitive dissonance (Weingarten & Lagerkvist, 2023). Furthermore, in the literature on reducing meat consumption, the effectiveness of interventions targeting socio-cultural variables like social norms is less clear (Kwasny, Dobernig & Riefler, 2022). This research will extend upon existing research by using a direct measurement of cognitive dissonance in an attempt to influence students' intentions to reduce meat consumption. Furthermore, different contexts are included to examine how this interacts with the intervention. Therefore, this study might yield new insights into how students' intention to eat meat can be influenced by using cognitive dissonance.

Additionally, this research can also yield policy implications, since experimental research has shown that cognitive dissonance can result in behavioural changes that are more environmental-friendly (Thøgersen, 2004). Subsequently, this research investigates the potential of using cognitive dissonance in increasing the intention to reduce meat consumption. Incorporating different contexts might be valuable for policy makers in establishing how they can optimally use cognitive dissonance. Furthermore, by targeting adolescents, a specific group of people is being researched. Since future interventions and policies that aim to reduce meat consumption will be more successful if they are target specific, rather than focused on the average consumer, this can provide crucial policy-making insights (Apostolidis & McLeay, 2016).

The research is structured as follows. In Chapter 2, a literature overview is presented and hypotheses are formed. Chapter 3 will give an elaborate overview of the methodology used in this research. Chapter 4 discusses the results of the analyses conducted. In Chapter 5, a discussion is given including the theoretical and practical implications, the limitations, and recommendations for further research. Finally, some concluding remarks will be given in Chapter 6.

2. Theoretical framework & literature study

The use of behavioral insights is currently emerging as an important policy tool. This is an important development since a government may have access to a broader range of policy tools to intervene and influence behavior change as a result of behavioral insights (Gopalan & Pirog, 2017). Existing research has already proven that behavioral insights can yield significant results. In this section, an overview is given of the relevant existing research. Section 2.1 briefly discusses the meat paradox. Section 2.2 discusses mechanisms that prevent or reduce cognitive dissonance. In Section 2.3 factors that influence cognitive dissonance are being discussed. In Section 2.4, the hypocrisy paradigm is discussed, which is a method to trigger cognitive dissonance. Section 2.5 discusses self-integrity and pro-environmental self-identity. Section 2.6 discusses the social context. Finally, hypotheses are being formed in Section 2.7.

2.1. The meat paradox

Building upon what was mentioned earlier, the meat paradox entails that people care about the lives of animals whilst simultaneously enjoy eating meat. It can be questioned why this phenomenon keeps on existing. One possible explanation can be that people are not engaged enough anymore in agriculture, which results in the meat industry staying this large (Thaxton, Christensen, Mench, Rumley, Daugherty, Feinberg & Scanes, 2016). In 2016, 98% of the U.S. population did not have a full understanding of food production (Thaxton et al., 2016). Consequently, people care about the lives of the animals they eat but do not know in what kind of circumstances the animals have lived. So, one possible explanation is that consumers are not aware of how meat is produced, and, therefore only weakly feel the dissonance between their values and actions. An alternative explanation could be that people tend to have the perception that meat is essential for a healthy diet (Jalil et al., 2020). Also, people describe the social, personal, and cultural values linked with meat consumption as being pleasurable (Macdiarmid et al., 2016). Furthermore, the pleasure of eating meat, as well as eating meat leading to socialization, weighs more in the consumption of meat than concerns about the environment and animal welfare (Hocquette, 2023). Finally, the social setting in which consumers live, the cultural significance of meat, and established social norms that place meat at the center of a dish, all contribute to people keep eating meat (Kwasny et al, 2022). Hence, there might be several reasons why people keep eating meat whilst caring about animal welfare values.

2.2. Preventing and reducing cognitive dissonance

Cognitive dissonance is an interesting theory to incorporate when considering the meat paradox. People's actions frequently do not align with their personal values, which subsequently can cause psychological discomfort and stress. When this state of psychological discomfort is felt, it is called cognitive dissonance. People often try to prevent or evade cognitive dissonance. There are several ways how people can deal with their dissonance. First of all, people tend to deal with it through confirmation bias. Confirmation bias is a bias where people reject or deny certain information that does not match their beliefs (Grimmelikhuijsen & Meijer, 2014). Through this bias, information is rejected not because it is false, but because it makes people uncomfortable. Furthermore, in existing research, a framework is built that identifies strategies how to deal with cognitive dissonance related to meat consumption. Rothgerber (2020) created the meat-related cognitive dissonance framework. In his framework, he identified certain strategies on how people prevented themselves from experiencing cognitive dissonance.

The first strategy people use to prevent cognitive dissonance is *avoidance*. With this strategy, people tend not to think about the animal or animal welfare when buying or consuming meat. Rothgerber (2020) found that only half of the people that considered animal welfare highly important, considered animal welfare when buying meat. Other research found that about 33% of consumers in Spain feel guilty when they are eating meat, due to animal welfare issues (Hocquette, 2023). Interestingly, this research also found that 42% of consumers admit not to think about the animal when they buy or eat meat. They choose to avoid painful information to prevent feelings of guilt. A second strategy that can be used is *willful ignorance*. With this strategy people not only avoid thinking about certain facts that can cause aversive feelings, they consciously choose not wanting to gather information and remain ignorant. (Rothgerber, 2020). Research found that people did not know about farming methods or animal welfare because they wanted to remain ignorant (Rothgerber et al., 2020.; Knight et al., 2003). Subsequently, the meat paradox keeps on existing because consumers use strategic ignorance to avoid the moral issues of consuming meat (Bouwman et al., 2022; Rothgerber, 2020). Furthermore, people tend to use *dissociation*, which people use to dissociate meat from the animal. As a result, Consumers create a mental state where they see meat and animals as two different things and like to disassociate the relation between them.

When people do not use these prevention mechanisms, meat-related cognitive dissonance is experienced. People prefer to prevent or reduce psychological distress in a variety of ways. One could say that when a persons' values and behavior do not align, their behavior could be changed to reduce these feelings of psychological discomfort. However, in practice, people use different methods to get rid of cognitive dissonance. Often moral guilt is reduced by de-humanizing animals, justifying eating meat or denying responsibility (Kwasny et al., 2022; Rothgerber, 2020). Examples of which are that people convince themselves that meat is essential for a healthy diet (Jalil et al.,2020). In addition, they convince themselves that they do not eat that much meat, so that they are only a small part of the problem (Rothgerber, 2020). These defense mechanisms can eventually even lead to a strengthening of meat consumption (Rothgerber, 2020). Hence, changing the behavior of consumers is not a simple process. Therefore, an intervention might be needed that can trigger a behavior change.

2.3. Factors influencing cognitive dissonance

In existing literature, there has been research into factors that can affect cognitive dissonance that people experience. Making people aware of their dissonance has the potential to set in motion a behavior change. People experience psychological discomfort associated with cognitive dissonance once they become aware of the discrepancy between their beliefs about behavior and their prior failures to perform the behavior, resulting in a motivation to change their behavior (Stone & Fernandez, 2008). This uncomfortable feeling could be used as a tool to change attitude and behavior.

2.3.1. Animal welfare, environment and personal health

Building upon the framework of Rothgerber (2020), three aspects that can influence meat-related cognitive dissonance can be distinguished, namely animal welfare, environmental issues, and health. When considering health, people tend to have the perception that meat is essential for a healthy diet (Jalil et al., 2020), which can cause people to keep eating meat. However, it can also be detrimental to health as processed meat increases the chances of chronic diseases (Macdiarmid et al., 2016). Informing people about the possible negative health effects could have an influence on meat consumption. Other research found that informing people in a virtual setting about the environmental consequences of meat consumption has been shown to result in reduced intentions to consume meat (Jalil et al., 2020). If one cares about the environment and is confronted with the environmental consequences of meat consumption, cognitive dissonance might arise.

However, research has found that animal welfare is the most important determinant of cognitive dissonance to arouse (Rothgerber, 2020; Hocquette, 2023). In the case of Australia, animal welfare is even suggested to be one of the most important factors to affect meat consumption (Hocquette, 2023). Hence, using animal welfare to trigger cognitive dissonance, might be very suited in trying to reduce the consumption of meat. Other research found results that strengthen this statement. In the research of Bouwman et al. (2020), the intention to choose a vegetarian lunch was tested in two settings. One setting was in a zoo (animal welfare) and the other was in a hospital (health). Their research found that value activation via animal welfare resulted in more feelings of cognitive dissonance than via health value activation. Consequently, this led to a higher intention to choose a vegetarian meal.

2.3.2. Cognitive dissonance through animal welfare

Animal welfare has often been used to trigger cognitive dissonance. Making people aware of the meat-animal relation, for instance, results in negative affect towards meat eating (Dowsett, Semmler, Bray, Ankeny & Chur-Hansen, 2018). By making them aware of the connection between the meat and the animal, their option to use *avoidance* disappears. Subsequently, making people aware of the meat-animal connection, resulted in cognitive dissonance and eventually led to a behavior change. This can be contributed to the fact that people often tend to disassociate meat and animal to avoid feelings of guilt. Making them aware of the relationship can remind them of their dissonant state (Benningstad & Kunst, 2020). Further research has shown that humanizing animals can result in feelings of anticipatory guilt (Wang & Basso, 2019), which can be used in reducing the intention to eat meat.

When considering using animal welfare in creating cognitive dissonance, gender is an important factor to take into account (Dowsett et al., 2018). In their research, Dowsett et al. (2018) made people aware of the meat-animal relationship. They found that making females aware of the consequences of their behavior led to cognitive dissonance and consequently behavior change. However, for men, this animal-meat connection did not appear to be beneficial in reducing meat consumption (Dowsett et al., 2018; Benningstad & Kunst, 2020). This could be because, compared to men, women reported more disgust and disapproval of eating meat (Rothgerber, 2020). Hence, the psychological discomfort that arises differs per gender. Reminding people of the meat-animal relationship appeared to be more effective for women than men (Kwasny et al., 2022; Dowsett et al., 2018; Benningstad & Kunst, 2020). Research by Weingarten & Lagerkvist (2023) found that showing participants conflicting images and texts of animals could trigger cognitive dissonance. This research, however, did not find any significant differences between women and men. Value activation through animal welfare might be a very interesting field to research, since more empirical research on the effectiveness of values on intention to eat meat is needed (Harguess et al., 2020)

2.4. Hypocrisy paradigm

Existing literature provides examples of cognitive dissonance interventions that have been proven successful. For example, much research has been conducted on how cognitive dissonance can be used to influence weight stigmas. It has for instance proved to be effective in reducing anti-fat attitudes (Breithaupt, Trojanowski & Fischer, 2020; Rodriguez, Marchand & Stice, 2008). Furthermore, the use of cognitive dissonance has been found to be effective in reducing disordered eating behaviors and eating disorder risk factors (Rodriguez et al., 2008; Stice, Marti, Shaw, & Rohde, 2019; Freijy & Kothe, 2013; Ciao & Latner, 2011), because creating a situation that causes psychological discomfort is effective in changing attitudes (Pennesi & Wade, 2018; Becker, Smith & Ciao, 2006). Changing the attitudes of people is most successful for people that are made aware of the discrepancy between their attitudes and values (Breithaupt et al., 2020; Rodriguez et al., 2008).

In the research mentioned above (Breithaupt et al., 2020; Rodriguez et al., 2008), the intervention was the most effective for the group that was made aware of the discrepancy between their attitudes and values. A method that can be used to create such a situation is the hypocrisy paradigm. The hypocrisy paradigm is an experimental method aimed at arousing cognitive dissonance. A well-known example is the research of Aronson, Fried & Stone (1991), which found that the intention to use condoms could be increased through the induction of hypocrisy. In their research, a situation was created where people had to preach for an AIDS prevention program and were asked about their own failures regarding condom use. By using hypocrisy to create psychological discomfort, the intention to use a condom was actually increased. In their research, the intention to increase condom use was the highest for the group that openly preached to prevent AIDS and was asked about their own failures, compared to the groups that did not have to preach or were not asked about own failures. This use of hypocrisy appeared to be more effective than solely information provision (Stone, Aronson, Crain, Winslow & Fried, 1994). Therefore, the use of hypocrisy might be very suited in changing behavior (Stone & Fernandez, 2008).

Other research found that people who were advocating for religious behaviors, but did not engage in them themselves, had higher self-reported levels of guilt and shame (Yousaf & Gobet, 2013). In order to trigger the cognitive dissonance, they found that it was necessary to ask the participant how often they had engaged in the activities and how often they should have engaged in these activities. It can also be of importance how the questions are structured in achieving this hypocrisy. Hypocrisy is perceived higher when someone first makes a statement about a personal standard and then has a behavior that violates that standard (Barden, Rucker & Petty, 2005). The use of hypocrisy can be especially effective in enhancing environmental-friendly behaviors (Priolo, Milhabet, Codou, Fointiat, Lebarbenchon & Gabarrot, 2016). Their research provided evidence that induced hypocrisy results in psychological discomfort when the injunctive norms become salient and people are reminded of their past behaviors.

Consequently, the adoption of future normative behaviors can be stimulated by using the discrepancy between a normative standard and past behavior (Priolo et al., 2016). Research of Priolo et al. (2016) found that the most successful way to create psychological discomfort was making use of 'injunctive inconsistency'. This entailed a situation where participants read injunctive messages and then were confronted with their transgressions. These findings demonstrate that the psychological distress of induced hypocrisy can be reproduced by making an injunctive norm salient and by reminding the participants of their Transgressions (Priori et al., 2016).

Cognitive dissonance can result both in changing attitudes and in changing behavior. However, through the induced hypocrisy paradigm, participants are more inclined to change their behavior to the norm, rather than changing their attitude (Odou, Darke, & Voisin, 2019). Additionally, using the cognitive dissonance theory through using the hypocrisy paradigm is most effective when participant openly propagate certain target behavior and then are reminded of their personal failures in adhering to that target behavior (Freijy & Kothe, 2013). As a result, there is a high discrepancy between their publicly spoken values and actual behavior. Therefore the hypocrisy paradigm is a method of cognitive dissonance intervention, that is particularly suited aiming at behavior change (Freijy & Kothe, 2013). Especially, because the best strategy for long-term habit modification may be hypocrisy (Aronson et al., 1991).

2.5. Self-integrity and pro-environmental self-identity.

When considering using a hypocrisy intervention, there are two factors that can be important to take into account. A component that needs to be considered in this mechanism is self-integrity. People view hypocrisy as a threat to their sense of self-integrity because it goes against their fundamental self-beliefs about sincerity and honesty (Stone & Fernandez, 2008). The easiest way to cope with this discomfort is by changing one's behavior (Stone &

Fernandez, 2008; Odou et al., 2019). Stone & Fernandez (2008) found that this effect is the greatest when the participants of the experiment have to write or record a persuasive message instead of just reading why it is of importance.

Later research also found that even when there are other unrelated possibilities for reducing dissonance, most people concentrate on engaging in the target behavior when they can immediately restore their sincerity and honesty (Stone & Focella, 2011). Subsequently, it can be imagined that people who value their self-integrity more, might be more inclined to perform the target behavior due to cognitive dissonance. Even when people are given the option between altering their behavior to restore their self-integrity, or engaging in an unrelated good behavior to ease their psychological distress, they tend to alter their behavior (Stone & Fernandez, 2008).

Other research found that cognitive dissonance was triggered by activating people's pre-existing animal welfare values (Bouwman et al., 2022). They found that making people reflect on their values regarding animal welfare, can result in cognitive dissonance which in turn leads to choosing vegetarian options. This study is a very simple study where asking people about values already triggers cognitive dissonance resulting in less meat consumption. In their study, participants are asked how uncomfortable people were choosing the meat option instead of the vegetarian option. This study showed that the effect was especially large for people with strong pro-environmental self-identity. Hence, people with a stronger pro-environmental self-identity experienced more psychological discomfort and were more inclined to choose a vegetarian option.

2.6. Adding social context to cognitive dissonance

As mentioned earlier, consuming meat is generally acceptable, and therefore, people may experience less dissonance when made aware of how their eating behavior may contradict a belief or have negative consequences (Rothgerber, 2020). Šedová, Slovák & Ježková (2016) also found that students do not experience meat eating as wrong, but are aware of the ethical and environmental issues that come along with it. Subsequently, this can result in a situation where students do not experience cognitive dissonance with meat consumption. While it might be generally acceptable, people's environments might still influence these feelings of dissonance. As a matter of fact, students' attitudes and behaviors are especially influenced by friends and fellow students (Šedová et al., 2016), and are affected by social norms. Especially adolescents are very much influenced by their networks (Al-Tarawneh, 2014). This results in a situation where people will be more inclined to take action when they think that many others are doing something (Cislaghi & Shakya, 2018). This can be contributed to the fact that adolescents are particularly sensitive to peer pressure due to their attempts to develop a sense of group identity (Brown, Lohr & McClenahan, 1986). Students are a very interesting target audience, since the identity of adolescents is still very much formed in that phase (Sandhu, Singh, Tung & Kundra, 2012)

Furthermore, when considering social norms, students are especially influenced by normative norms rather than descriptive norms (Schenk et al., 2018; Zhou, Zhang, Shadel & Liang, 2022). Additionally, in trying to reduce meat consumption, normative norms are more effective than descriptive norms, because both the meat and vegetarian choice are seen as legitimate and therefore their behavior is less influenced by others (Schenk et al., 2018). Thus, introducing a social context with normative norms might trigger psychological discomfort. Other research also found that making people aware of the discrepancy between the normative norms and descriptive norms, can be a tool in enhancing pro-environmental behavior (Priolo et al., 2016).

In light of the hypocrisy paradigm, induced hypocrisy interventions were most effective for people who openly advocated for certain behavior and were reminded they failed to adhere to that behavior (Freijy & Kothe, 2013; Aronson et al., 1991). These examples show that social context can be of influence when using an intervention based on cognitive dissonance. In these examples, the social context was created by a situation where participants were told that they had to give a speech to a group. Survey research, however, frequently fails to take into account the social context in which people establish their attitudes and concerns (Olli, Grendstad & Wollebaek, 2001). Hence, this research incorporates a social context to see how this affects the cognitive dissonance intervention.

2.7. Hypotheses

There have been several studies that have examined how cognitive dissonance can be used in experimental research. Considering the existing literature, some hypotheses can be drawn. First of all, it has been found that, as there is a higher level of cognitive dissonance, there is a higher urge for people to reduce their dissonant state (Weingarten & Lagerkvist, 2023). Furthermore, creating psychological discomfort through hypocrisy appeared to be effective in changing intentions (Aronson et al., 1991). Considering existing research, this research hypothesises that a higher level of cognitive dissonance, results in a higher urge for participants to change intentions regarding meat consumption

Hypothesis 1: *A higher level of cognitive dissonance increases people's intention to reduce meat consumption*

Furthermore, people perceive an act of hypocrisy as a threat to their self-integrity (Stone & Fernandez, 2008). This raises doubts about their own sincerity and honesty. Research found that people appear to engage in target behavior, to restore their sincerity and honesty (Stone & Focella, 2011). Therefore, one can imagine that people who have a higher self-integrity feel a higher urge to restore their self-integrity when confronted with hypocrisy. Hence, this research hypothesises that the cognitive dissonance intervention results in a higher intention to reduce meat consumption for people with a higher self-integrity

Hypothesis 2: *The cognitive dissonance intervention is more effective for participants with a higher self-integrity.*

Also, the context in which the intervention is carried out might be of importance. It has been found that induced hypocrisy interventions are most effective when people openly advocate for something and then are reminded of their individual failures in adhering to that behavior (Freijy & Kothe, 2013; Aronson et al., 1991). With this discrepancy between publicly spoken values and actual behavior, feelings of hypocrisy arise. The social context can be of importance since students are especially influenced by friends and fellow students (Šedová et al., 2016), and, are influenced by normative norms (Schenk et al., 2018; Zhou et al., 2022). Thus, this research hypothesises that the intervention results in a higher intention to reduce meat consumption in the social context compared to the non-social context.

Hypothesis 3: *There is a larger effect of the cognitive dissonance intervention in the social context compared to the non-social context*

Finally, research has shown that people with a higher pro-environmental self-identity, are more affected by value activation through animal welfare and are more inclined to reduce their intention to eat meat (Bouwman et al., 2022). Their research found that cognitive dissonance was triggered using animal welfare values. This research expects a similar effect using a cognitive dissonance intervention. It is expected that participants that have a higher pro-environmental self-identity, experience more feelings of cognitive dissonance, and are more inclined to reduce their meat consumption. Therefore, this research hypothesises that the cognitive dissonance intervention is more successful for participants with a stronger pro-environmental self-identity

Hypothesis 4: *The cognitive dissonance intervention is more effective for participants with a higher pro-environmental self-identity.*

3. Methodology

The methodology of this investigation is detailed in this chapter. The research design is discussed in Section 3.1. The participants are discussed in Section 3.2, and the sample size is discussed in Section 3.3. Following that, in Section 3.4, the measures are examined, and in Section 3.5, the control variables are elaborated. Finally, Section 3.6 goes with research ethics.

3.1. Research design

An online experiment with a 2x2 between-subjects design is used for this study. With this design each participant only experiences one condition, and their outcomes can be compared. The two main conditions for the experiment are as follows: the following strategies ((no) cognitive dissonance) are being used in the following contexts (social/non-social). By focussing on the intentions rather than actual behavior, it becomes a study that is related to the psychology field (Perino & Schwirplies, 2022). The study thereby aims to determine whether a cognitive dissonance-based intervention can successfully increase students' intentions to reduce meat consumption

The experiment is constructed as follows. Via Qualtrics a survey is created. The survey starts with demographic questions (age, gender, study). These questions will be used as screening questions to reach the intended target audience. After the demographic questions, the first manipulation will occur. Using the randomization function of Qualtrics, participants are divided into two groups. One group is asked questions about their personal values in a non-social context. For the other group, a social context is created by a message that states that there answers are possibly shared with other participants of the study. The aim of this message is making the social context and norms salient, which might affect the participants. In both groups, participants are being asked about their values regarding animal welfare, self-integrity, and pro-environmental self-identity. Animal welfare is used as a value since it is one of the most important factors influencing meat consumption (Hocquette, 2023).

After filling out these questions, another manipulation takes place. Now a cognitive dissonance (CD) intervention occurs. Half of the participants in the social group is being asked about their meat consumption behavior the past 7 days (Social, CD). The other group will not receive these questions and moves on to the next part (Social, no CD). Based on the answers of the intervention group, a text message can occur. This message was sent if people held high values for animal welfare but did not act on those ideals. When this occurred, the participants were made aware of the discrepancy between their values and actions. Because hypocrisy is viewed more strongly when someone first makes a statement about a personal standard and then engages in behavior that breaches that standard (Barden t al., 2005), the order of first asking about their standard and then about violating behavior is used. Aim of this intervention is to trigger dissonance, which subsequently could impose a reduced intention to eat meat. For the non-social context, this works similar. Half of the participants receive questions about their behavior and possibly an intervention message (Non-social, CD). The other half moves on to the next part of the questionnaire (Non-social, no CD). After this manipulation, cognitive dissonance and intention to reduce meat consumption are being measured.

3.2. Participants

The survey will start with demographic questions which immediately act as screening questions. There are some requirements for students to participate in the survey. First of all, the participants are required to be between 18 and 25 years old. This is a requirement since the behavior of adolescents is being researched. If this is not the case, the survey will end immediately. Subsequently, the participants are asked if they study at a University or a University of Applied Sciences. If this is not the case, the survey will end. Furthermore, there is a screening question asking how often the participants eat meat. If they do not eat meat, the survey ends. The participants of this study are gathered via social media. Platforms such as WhatsApp and LinkedIn will be used, since this is an effective way to reach fellow students. Since there is a limited time frame, gathering participants via these channels is suitable for getting an appropriate amount of respondents, for conducting the research.

3.3. Sample size

In determining the minimum sample size, a power analysis is conducted in G*Power 3.1.9.7. The statistical test that is chosen is an F-test with ANOVA: fixed effects, special, main effects, and interactions. With this test, subjects can be measured under different conditions. Because it is utilized to determine the necessary sample size, the power analysis will be performed a priori. Previous research has found that, with cognitive dissonance interventions, the sample size is set to detect a small effect size (Dowsett et al., 2018). The set effect sizes to find the sample size a priori, in similar research, ranged from $f = 0.15$ (Bouwman et al, 2022), to $f = 0.25$ (Le, Barendregt, Hay, Sawyer, Paxton & Mihalopoulos, 2017). Therefore this study will use an effect size within that range. The effects size for this study is set at $f = 0.25$, the alpha is set at 0.05 and power $(1\text{-}\beta) = 0.8$. Because it is a between-subject design, the numerator df = 1 and the number of groups is 4. Using G*power 3.1.9.7, the estimated total sample size n =

128. This is the amount of participants that is needed to make useful statements about the results.

3.4. Measurement

3.4.1. Measuring animal welfare

The values that are being measured in this research are measured in several ways. First of all, the values regarding animal welfare are being measured. These values are being measured based on questions from previous research (Mayfield, Bennet, Tranter & Woolridge, 2007). The participants are asked to rate how important some statements are. Two statements will be used to measure animal welfare values of the participants. The statements are: "I think animal welfare is important" and "I think it is important that animals should have had a good life before getting slaughtered". Participants can answer these statements using a 7-point Likert scale ranging from 1 (totally agree) to 7 (totally disagree). With how these statements are being framed, the injunctive norms are tried to be made salient, since it assesses the extent to which they agree with these injunctive norms.

3.4.2. Measuring behavior

Furthermore, the participants are asked about their meat consumption behavior the past week. The participants are being asked: "How many times have you eaten meat in the past 7 days?", with answers ranging from 'Less than 3 to 'More than 7'. The other question is: "Have you bought biological meat last 7 days because it is better for animal welfare? This will be a yes/no question. Aim of these questions is to trigger an intervention message when the behavior does not appear to align with the values stated by the participants. If participants have stated that animal welfare is important to them, but have eaten much meat last week or failed to buy biological meat, they get a message making them aware of the discrepancy between their beliefs and behavior.

3.4.3. Measuring cognitive dissonance

It can be difficult to measure cognitive dissonance. Earlier research developed a measure that relied on a Likert scale (Bouwman et al., 2022; Elliot & Devine, 1994). However, more recent research criticized these studies, claiming that a Likert scale is inappropriate for measuring cognitive dissonance (Weingarten & Lagerkvist, 2023). Using a Likert scale is inappropriate since it has a defined zero-point whereas with cognitive dissonance there is a continuous state between consonance and dissonance (Weingarten & Lagerkvist, 2023). A bipolar semantic scale is a more suited way of measuring since there is no zero-point. By using a bipolar semantic scale, cognitive dissonance can be measured while reducing response biases and agreement biases, which can be a liability with the Likert scale (Weingarten & Lagerkvist, 2023). Measuring cognitive dissonance will be done using 5 items, based on previous research (Weingarten & Lagerkvist, 2023). A 7-point semantic bipolar scale will be used containing the following items: (relaxed-distressed; easy-uneasy; comfortable-uncomfortable; pleased-bothered; calm-upset) (Weingarten & Lagerkvist, 2023). These five items will be addressed regarding the following question: “How do you feel about your own meat consumption?”.

3.4.4. Measuring intention to eat meat

Measuring the intention to eat meat will also be based on existing research (Onwezen, Van't Riet, Dagevos, Sijtsema & Snoek, 2016; Bouwman et al., 2022). This measurement will be similar to the previous measurement. Again a 7-point Likert scale will be used ranging from 1 (totally disagree) to 7 (totally agree). The participants are being asked: ”When thinking about the future, which of the following is likely?”. There will be 3 items: ‘I am planning to eat less meat’; ‘I am considering eating less meat’ and ‘I will absolutely eat less meat’. Again, the participants can answer the extent to which they agree with the statements

3.4.5. Measuring self-integrity

Furthermore, self-integrity is being measured. This is being measured since it can have a role in creating cognitive dissonance. People that behave in a hypocritical way perceive it as a threat to their self-integrity (Stone & Fernandez, 2008). As a result, they feel the urge to act in a more sincere and honest manner. Measuring self-integrity will be done using 3 items. A Likert scale is used which ranges from 1 (totally disagree) to 7 (totally agree). The items will be: ‘In general, I feel that I act on my principles and values’, ‘I feel moral responsibility in my decisions and actions’, and ‘Acting ethically is important to me’.

3.4.6. Measuring pro-environmental self-identity

Finally, earlier research has shown that the effect of value activation via cognitive dissonance on meat consumption was stronger for people who had a strong pro-environmental self-identity (Bouwman et al., 2022). Therefore, this will also be incorporated into this research. Based on earlier research, pro-environmental self-identity is being measured (Bouwman et al., 2022; Van der Werff, Steg & Keizer, 2013). A 7-point Likert scale is being used from 1 (totally disagree) to 7 (totally agree). This is based on 3 items. The items testing this pro-environmental self-identity are: ‘Being environmentally conscious is a fundamental aspect of my identity, 'I usually act environmental-friendly', 'I consider myself to be an environmental-friendly person'.

3.5. Control variables

In this study, there might be certain factors that can influence the outcome of the research. It is important that these will be accounted for in the research. First of all, gender will be taken into consideration. Previous research has found that a cognitive dissonance intervention, through a meat-animal connection, yielded different results for women and men (Dowsett et al., 2018). Other research, however, did not find any significant differences between women and men in their cognitive dissonance intervention outcome (Weingarten & Lagerkvist, 2023). Because gender could possibly have an influence on the outcome of this research, it will be used as a control variable. Furthermore, education will be taken into account as a control variable. Since this research only uses students from the university of applied sciences or university, it is not expected to make a very significant difference. It will, however, be accounted for to see if this difference in education influences the outcome. Both variables will be made dummies, to see whether it explains variance in the dependent variable.

3.6. Research ethics

Research ethics are being considered by ensuring anonymity and confidentiality of the data and the respondents. In order to create a social context, participants are being asked for consent that their answers might be shared with other respondents of the research. When giving consent, the participants are being asked to give their full name. This information will be used anonymously and the consent to share their answers was only needed to create a social context, but will not actually be used. Hence, the confidentiality is still being ensured. Furthermore, the respondents are being told that they can quit the survey any time they want. In the survey, information is provided about the topic of the research, as well as the purpose of the research. The way this research is built and which mechanisms are used, however, are concealed.

3.7. Data analysis

In this research an ANOVA analysis will be conducted to measure the effect of the intervention on the intention to reduce meat consumption. The means of two or more groups can be compared using ANOVA, which is especially appropriate for this study because a 2x2 between subject design is used. Similar research also used ANOVA in testing what the effect of an intervention was on their dependent variable (Bouwman et al., 2022; Dowsett et al., 2018). To test whether the ANOVA can be used for this research, the assumptions of ANOVA will be tested. First of all it will be tested if the variables are normally distributed. This will be done using a Shapiro-Wilk test. Furthermore, homogeneity of variance is assumed. This will be tested using Levene's Test. If any of these assumptions are violated, a non-parametric Kruskal-Wallis test will be conducted to verify if the results of the ANOVA are valid. ANOVA furthermore assumes independence of observations. Since the experiment is conducted in an online individual environment, there is a certain independence of observations. However, there might be dependency due to the fact that the participants are gathered in the same social network and therefore might have similarities.

4. Results

This chapter will give an overview of the results of this study. In Section 4.1 information about the sample and data will be given. Section 4.2 contains some preliminary analyses that preceded the hypotheses testing. Section 4.3 gives an overview to the results of the hypotheses testing. Finally, Section 4.4 describes some alternative analyses that have been conducted.

4.1. Descriptive statistics

4.1.1. Sample information

This research gathered a total of 239 respondents. In total 23 respondent did not finish the survey and were excluded from the analysis. 19 respondents did not meet the criteria for age and were excluded. 25 respondents currently did not study and were excluded. Furthermore, 11 respondents did not eat meat and 1 respondent did not fill out an entire set of questions. After excluding the respondents that did not meet the criteria for the research, the sample contained n = 170 respondents. Furthermore, there were some respondents who were being asked about their consumption behavior, but whose answers did not trigger the intervention message. Since this research examines the effect of an intervention where people are made aware of their hypocrisy, these respondents are excluded from the research. After excluding those respondents the sample contained n = 141 respondents.

A decision was made not to exclude respondents whose answers contained forms of straight lining. The questions were designed in a way that multiple questions tested the same values. Hence the decision is made to incorporate these values in the analysis. Reverse questions in the survey could have prevented the forms of straight lining, but have unfortunately not been used. The demographic analysis of the participants is shown in Table 1. The survey yielded a rather balanced sample regarding gender. 52% of the respondents answered to be 'Male' and 48% answered to be 'Female'. Furthermore the mean age of the respondents was 22.75 years old. Finally, the division university of applied sciences and university students was 26%/74%. An elaborate overview of the demographics can be seen down below.

Characteristic	N = 141 [1]
Gender	
Female	67 (48%)
Male	74 (52%)
Age	
19	2 (1.4%)
20	14 (9.9%)
21	15 (11%)
22	24 (17%)
23	35 (25%)
24	33 (23%)
25	18 (13%)
Education	
HBO	36 (26%)
WO	105 (74%)

[1] n (%)

Table 1: socio-demographic characteristics

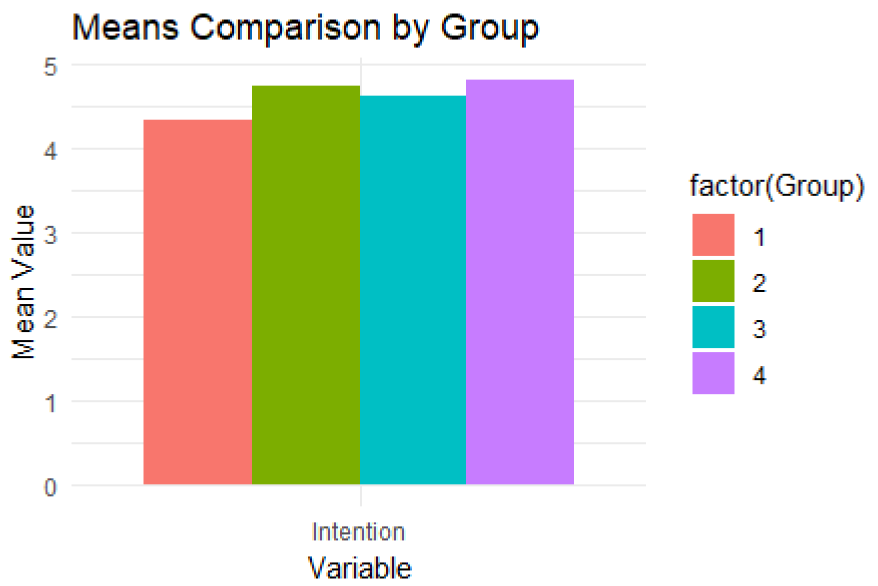
4.1.2. Missing values

In total this study incorporated 141 respondents that were useful for research. In total the respondents failed to fill out 15 questions, resulting in 15 missing values. Out of these values there were 15 values missing completely at random. 13 respondents had 1 missing value completely at random, and, one respondent had 2 missing values completely at random. The survey was built upon a set of questions that tested specific aspects. The missing values were missing in a sequence of questions that were testing the same particular specific aspect. Multivariate imputation by chained equations (MICE) is used to generate the missing values. This method is used since the observed data are strongly predictive of the missing values, and therefore, the imputations will be more consistent across imputations, leading to smaller but still precise standard errors (Azur, Stuart, Frangakis & Leaf, 2011; Greenland and Finkle, 1995). Hence using MICE is a suited way to generate the missing values.

4.1.3. Visualizing the data

In graph 1, the mean values of the dependent variable can be found. For clarification the groups are labelled as follows:

- Group 1 = no cognitive dissonance intervention, non-social context
- Group 2 = cognitive dissonance intervention, non-social context
- Group 3 = no cognitive dissonance intervention, social context
- Group 4 = cognitive dissonance intervention, social context.



Graph 1: Means per variable.

When exploring the means. it stands out that for every group, the mean values of the intention to reduce meat consumption are very similar. It ranges from 4.33 (no CD, Non-social context) to 4.81 (CD, Social context). Based on these mean values, it can be expected that the intervention as well as the context creation did not significantly impact the dependent variable.

4.2. Preliminary analysis

4.2.1. Reliability analysis

With surveys, often multiple questions are being asked to test the same attitude or concept. The answers to these questions should be highly correlated and positive. Hence a reliability analysis is conducted for measuring several aspects in this research. If these questions appear to be highly correlated and positive, a composite score can be made to put the values into one variable. Reliability is tested using Cronbach's Alpha. Cronbach's Alpha is tested for welfare values, self-integrity, pro-environmental self-identity, cognitive dissonance and intention to reduce meat consumption. For cognitive dissonance, Cronbach's Alpha is 0.94, which means that the questions are highly correlated and positive. Furthermore, for self-integrity Cronbach's Alpha is 0.71, which shows enough correlation. Pro-environmental self-identity has a Cronbach's Alpha of 0.87 and welfare values 0.75. Finally, intention to reduce meat consumption has a Cronbach's Alpha of 0.92. Thus for all the aspects that are being measured, the questions measuring the aspect correlate. Consequently, composite scores are made for these variables to simplify the analysis of the variables. The analyses that tested the reliability of the questions can be found in Appendix A.

4.2.2. Multicollinearity

To test whether there might be multicollinearity, a correlation matrix is generated among the predictor variables. In general, a correlation of >0.7 indicates the presence of multicollinearity. The results show a moderate correlation between self-integrity and pro-environmental self-identity (0.53). Furthermore, all predictor variables have low to moderate positive or negative correlation, implying that there is no multicollinearity in my model. This suggests that without the influence of strong collinearity between them, I can reliably assess the individual impacts of the predictor variables on the intention to reduce meat consumption.

	CompositeIntegrity	CompositeEnvironment	Intervention	Context	CompositeWelfare
CompositeIntegrity	1.00000000	0.5317194	0.119076303	0.041554982	0.22258350
CompositeEnvironment	0.53171944	1.0000000	0.102191259	-0.112554448	0.29944047
Intervention	0.11907630	0.1021913	1.000000000	-0.003093429	0.15200947
Context	0.04155498	-0.1125544	-0.003093429	1.000000000	0.01397405
CompositeWelfare	0.22258350	0.2994405	0.152009470	0.013974050	1.00000000

Table 2: Correlation matrix

4.2.3. Covariates

In this study, also covariates are controlled for. It is tested what is the influence of the variables *Gender* and *Education*. To test whether these variables have an influence on the intention to reduce meat consumption, they are explored as covariates. The first covariate that is explored is *Gender*. Earlier research found that making females aware of their behavior could lead to cognitive dissonance and behavior change, while for men this mechanism did not appear to work (Dowsett et al., 2018). *Education is* also explored using an a multiple regression model. When conducting the multiple regression, only *Gender* is statistically significant. The multiple R-squared shows that 7.2% of the variance in intention to reduce meat consumption is explained by gender. The intercept coefficient represents the mean value of intention to reduce meat consumption for males (4.22). The coefficient of Genderdummy1 represents the estimated mean difference in intention to reduce meat consumption of females compared to males. Both are statistically significant. This means that *Gender* has a statistically significant positive effect on intention to reduce meat consumption, entailing that females generally have higher scores of intention to reduce meat consumption compared to males. *Education* was also tested as a covariate. However, no statistically significant effect was found between the two education levels (p = 0.53). Based on earlier research it was expected that *Education* would not have an influence in predicting intention to reduce meat consumption (Rothgerber, 2020). Thus *Gender* will be incorporated as covariate in the research. The covariates self-integrity and pro-environmental self-identity will be explored in the hypothesis testing in Section 4.

```
Call:
lm(formula = CompositeIntention ~ GenderDummy, data = Final_dataset)

Residuals:
    Min      1Q  Median      3Q     Max 
-3.2249 -0.6446  0.1051  1.0254  2.7751 

Coefficients:
             Estimate Std. Error t value Pr(>|t|)    
(Intercept)    4.2249     0.1574  26.849  < 2e-16 ***
GenderDummy1   0.7498     0.2283   3.284  0.00129 ** 
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.354 on 139 degrees of freedom
Multiple R-squared:  0.07202,	Adjusted R-squared:  0.06535 
F-statistic: 10.79 on 1 and 139 DF,  p-value: 0.001293
```

Table 3: ANCOVA covariates

4.2.4. Testing assumptions

To test whether an ANOVA can be used, the distribution of the variables needs to be looked upon. ANOVA assumes that the data is normally distributed. If this assumption is violated, this can impact the validity of the results. To see whether the variables are normally distributed, multiple histograms were created and a Shapiro-Wilk test was conducted. A Shapiro-Wilk test is conducted since it assesses normality. In Appendix B the results of the tests can be found. Of the variables, welfare, self-integrity, pro-environmental self-identity, cognitive dissonance and intention to reduce meat consumption, only pro-environmental self-identity appeared to be normally distributed. As a result, a robustness check needs to be considered to assess the validity of the results. Therefore a Kruskal-Wallis test is conducted, which is a non-parametric alternative to the ANOVA test. This test will used as robustness check to see if the outcomes are the same.

To test the homogeneity of variance, Levene's Test is be conducted. The results of this test can also be found in Appendix B. The test showed that there is no significant difference in variance between the groups ($F = 0.01$, $p = 0.92$), which indicated that the assumption is met and there is homogeneity of variance.

4.3. Hypotheses testing

4.3.1. Cognitive dissonance and intention to reduce meat consumption

Hypothesis 1: *A higher level of cognitive dissonance increases people's intention to reduce meat consumption*

To test whether a higher level of cognitive dissonance increases people's intention to reduce meat consumption, an ANOVA test in R is conducted. In this test the covariate *Gender* is incorporated. The results of the test can be seen in Table 4. The predictor (dissonance) has a F-value of 42.50, which is very high. This suggests that cognitive dissonance has a very strong effect on the dependent variable (intention to reduce meat consumption). Furthermore, the P-value is very low (1.23e-09), which means that the effect found is highly significant at alpha = 0.001. Therefore, it can be stated that there is a significant positive relation between cognitive dissonance and intention to reduce meat consumption. When considering the hypothesis, a causal relationship cannot be established. It could also be possible that people feel more dissonance because they have a higher intention to reduce meat consumption. It can however be concluded that a higher dissonance does correlate with a higher intention to reduce meat consumption.

```
                     Df Sum Sq Mean Sq F value   Pr(>F)    
CompositeDissonance   1  63.02   63.02  42.502 1.23e-09 ***
Gender                1   6.81    6.81   4.593   0.0339 *  
Residuals           138 204.62    1.48                     
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Table 4: ANOVA dissonance on intention to reduce meat consumption

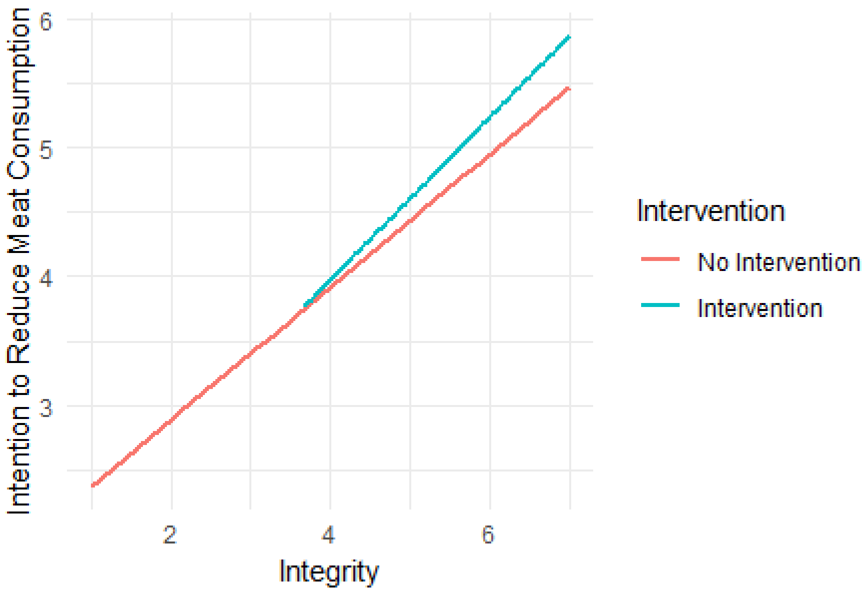
Since the the variables were not normally distributed, a robustness check is conducted using a Kruskal-Wallis test. The results of the test show a chi-squared of 52.89 and a p-value of 0.0006. This indicates that the distribution of intention to reduce meat consumption differs significantly among different levels of cognitive dissonance. This suggest a significant effect of cognitive dissonance on the intention to reduce meat consumption, which is in line with the ANOVA conducted before. The results of the test can be found in Appendix C.

4.3.2. Effect self-integrity on intervention

Hypothesis 2: *The cognitive dissonance intervention is more effective for participants with a higher self-integrity*

Hypothesis 2 predicts that the intervention is more effective for participants that have a higher self-integrity. This hypothesis aims at uncovering the interaction effects between the intervention and self-integrity. With this interaction the effect on intention to reduce meat consumption is measured. In examining the interaction between self-integrity and the intervention, an ANOVA analysis will be used. Self-integrity was added as an independent variable in an effort to account for any potential impact it might have on the outcome variable and to incorporate the interaction effect.

First, a plot was drafted to see what the expected results of the ANOVA were. In graph 2, it can be seen that there is a positive relationship between self-integrity and intention to reduce meat consumption. Within the graph the slopes of the intervention groups as well as non-intervention group is displayed. It can be seen that the slope of the intervention group is slightly steeper than the slope of the non-intervention group. This results in greater differences between the intervention group and non-intervention group, for higher levels of self-integrity. This would suggest that the intervention is more effective for participants with a higher self-integrity.



Graph 2: Self-integrity and Intention to reduce meat consumption

To test whether this holds, an ANOVA is conducted. In Table 5, the results of the ANOVA can be seen. The direct effect of the intervention on the intention to reduce meat consumption, as well as the interaction effects, were investigated in this particular test. When looking at the isolated effect of the intervention, it is not significant and thus is not a good predictor of intention to reduce meat consumption ($p = 0.38$). In this analysis, the interaction between the intervention and self-integrity is also incorporated to investigate its potential influence on intention to reduce meat consumption. The interaction between the intervention and self-integrity also is not significant and thus not a good predictor ($p = 0.71$). Self-integrity, however, shows an F-value of 21.52 and is highly statistically significant ($p <0.001$). Therefore, self-integrity is a significant main effect. This means that variations in self-identity are correlated with differences in intention to reduce meat consumption. Furthermore, gender also produced a significant main effect with a F-value of 10.24 ($p = 0.0017$). Therefore it can be stated that gender differences also explain variations of the dependent variable.

When exploring the means of the outcome variable in Graph 1, It could be seen that the means of the all the groups were very similar. Thus it is not very surprising that the effect appears to be not significant. The significant effect of self-integrity on intention to reduce meat consumption could be one of the reasons why the intervention did not appear to be significant. It is possible that people with higher self-integrity already had a strong intention to reduce meat consumption, therefore decreasing the effect of the intervention.

```
                              Df Sum Sq Mean Sq F value   Pr(>F)    
CompositeIntegrity             1  35.02   35.02  21.523 8.13e-06 ***
Intervention                   1   1.28    1.28   0.786  0.37698    
Gender                         1  16.66   16.66  10.240  0.00171 ** 
CompositeIntegrity:Intervention  1   0.23    0.23   0.142  0.70668    
Residuals                    136 221.27    1.63                     
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Table 5: ANOVA hypothesis 2

Again a robustness check is conducted. To see whether the level of self-integrity has an effect on the effectiveness of the intervention, a Kruskal-Wallis test is conducted for a low self-integrity group and a high self-integrity group. For the high-integrity group the results show no significant effect (chi-squared = 1.19, p = 0.28) and the low-integrity group shows also no significant results (chi-squared = 0.11, p = 0.74). These results indicate that the intervention does not have a significant effect on the intention to reduce meat consumption. This shows the same results as with the ANOVA that is conducted. The results of the tests can be found in Appendix C.

4.3.3. Effect social context on intervention

Hypothesis 3: *There is a larger effect of the cognitive dissonance intervention in the social context compared to the non-social context*

In testing the third hypothesis, again an ANOVA analysis is conducted. To see whether the intervention was more effective in the social context than the non-social context, an interaction term between intervention and context is included in the analysis. When analysing the previous hypothesis it was found that the intervention did not have a direct effect on intention to reduce meat consumption, nor in interaction with self-integrity. The findings of this ANOVA analysis reveal that context has no effect on the intention to reduce meat consumption (p = 0.40). Furthermore, the intervention is not significant (p = 0.18) and the interaction between the intervention and the context is also not significant (p = 0.60). Thus the intention to reduce meat consumption is not dependent on whether there is an intervention or whether there is a social or non-social context. Therefore it can be concluded that, for this research, it cannot be stated that the intervention is more effective in a social context than a non-social context. When looking at Graph 1 in Section 4.2.3. this result was expected since the means of intention to reduce meat consumption is very similar across contexts. This could indicate that the way a social context was create did not have the desired effects. Reasons for this could be that the social context did not become salient enough and participants did not experience the desired effects a social context could create.

```
                      Df Sum Sq Mean Sq F value  Pr(>F)   
Intervention           1   3.34   3.339   1.810 0.18076   
Context                1   1.34   1.340   0.726 0.39561   
Gender                 1  18.40  18.400   9.975 0.00196 **
Intervention:Context   1   0.50   0.502   0.272 0.60276   
Residuals            136 250.88   1.845                   
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

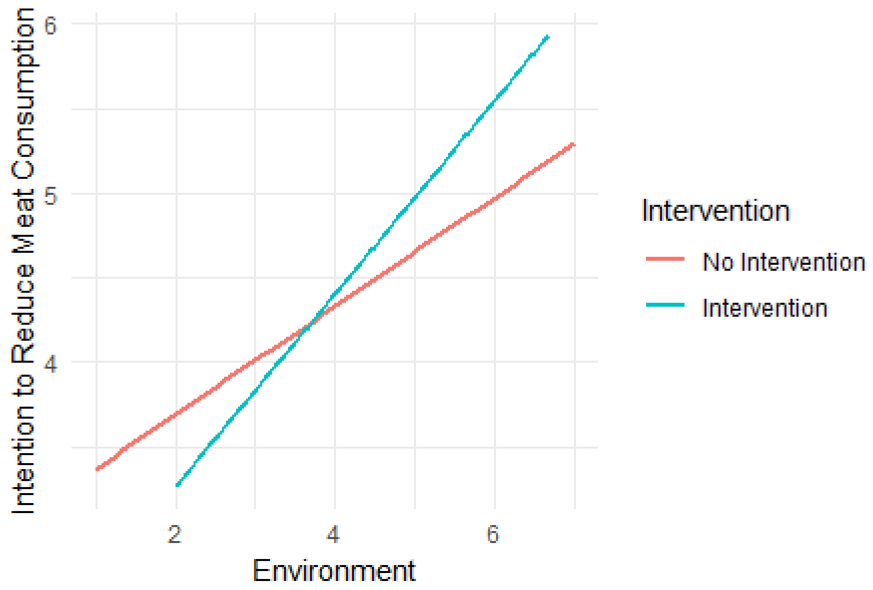
Table 6: ANOVA hypothesis 3

Again a Kruskal-Wallis test is conducted. It is conducted for both the intervention and non-intervention group, both in the social and non-social context. The results of these tests again can be found in Appendix C. The results show, for every group, a p-value > 0.05. Therefore it can be concluded that it is not statistically significant. This suggests that there are no significant variations in the intention to reduce meat consumption among the intervention groups, both in the social and non-social contexts. This robustness check is in line with the ANOVA conducted which provided the same results.

4.3.4. Effect pro-environmental self-identity on intervention

Hypothesis 4: : *The cognitive dissonance intervention is more effective for participants with a higher pro-environmental self-identity.*

The fourth hypothesis is rather similar to the second hypothesis, but tests whether the intervention is more effective for participants with a higher pro-environmental self-identity. Again, an ANOVA analysis is conducted measuring the direct effect of the intervention and looking at the interaction effect between the intervention and pro-environmental self-identity. Pro-environmental self-identity is added to incorporate the interaction effect in the analysis. To inspect the relationship between pro-environmental self-identity and intention to reduce meat consumption, a plot is drafted. This plot can be seen in graph 3. As can be seen there is a positive relationship between pro-environmental self-identity and intention to reduce meat consumption. What stands out is that the slope of the intervention line is steeper than the line of the non-intervention group. In this graph, when people have a lower pro-environmental self-identity, the non-intervention group has a higher intention to reduce meat consumption relative to the intervention group. When people have a higher pro-environmental self-identity, the intervention group has a higher intention to reduce meat consumption, relative to the non-intervention group. This could be due to the fact that the intervention was more effective for people with a strong pro-environmental self-identity.



Graph 3: Pro-environmental self-identity and Intention to reduce meat consumption

To test whether this holds, an ANOVA is conducted. With this test the direct effect of the intervention on the intention to reduce meat consumption is measured, as well as the interaction effects of the intervention with pro-environmental self-identity. The results of this analysis can be seen in Table 7. Again there was no significant direct effect of the intervention on intention to reduce meat consumption (p = 0.34). Thus it can be stated that it is not a good predictor of the dependent variable. When looking at the interaction effect it is not surprising that this is not significant as well (p = 0.39). However, the effect of pro-environmental self-identity on intention to reduce meat consumption is highly significant (p < 0.001) and has a high F-value (21.62). Hence pro-environmental self-identity has a significant main effect on the dependent variable. Since pro-environmental self-identity and integrity had a moderate correlation, it is not surprising that pro-environmental self-identity also has a significant effect on the dependent variable.   Similar to self-integrity, it can be possible that the people with a higher pro-environmental self-identity already had a higher intention to reduce meat consumption, weakening the effect of the intervention.

```
                                  Df Sum Sq Mean Sq F value   Pr(>F)    
CompositeEnvironment               1  35.26   35.26  21.623 7.77e-06 ***
Intervention                       1   1.51    1.51   0.923  0.33837    
Gender                             1  14.72   14.72   9.027  0.00317 ** 
CompositeEnvironment:Intervention  1   1.23    1.23   0.753  0.38695    
Residuals                        136 221.75    1.63                     
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Table 7: ANOVA hypothesis 4

A Kruskal-Wallis test is used to conduct a robustness check on these results. To test whether the pro-environmental self-identity has an influence on the intervention, the distributions of the intention to reduce meat consumption are compared across the intervention groups, for both a high and low pro-environmental self-identity. The analysis can be seen in Appendix C. For both high pro-environmental self-identity ($p = 0.22$) and low pro-environmental self-identity ($p = o.61$), there is no significant effect of the intervention on the intention to reduce meat consumption. Therefore it can be stated that, at a significance level of 0.05, the intervention has no significant effect on the intention to reduce meat consumption, regardless of the level of pro-environmental self-identity. This aligns with the results of the ANOVA analysis

4.4. Alternative explanations

In the hypothesis testing it was found that the intervention did not appear to have a significant effect on the dependent variable (intention to reduce meat consumption). There was however a strong effect for self-integrity and pro-environmental self-identity on intention to reduce meat consumption. Furthermore, a significant positive relation between cognitive dissonance and intention to reduce meat consumption was established (p , 00.1, F-value = 42.50). Hence it is interesting to establish if there is an indirect effect of the intervention on the intention to reduce meat consumption. As can be seen in Table 8, an ANOVA is conducted to see the effect of the intervention on cognitive dissonance among the participants. Gender, self-integrity, context and pro-environmental self-identity are incorporated into the model. This analysis shows, in contradiction to other hypotheses, a positive significant effect of the intervention ($p = 0.03$, F-value = 8.86). This indicates that the intervention successfully increased levels of cognitive dissonance. As can be seen there are no statistically significant interaction effects between the intervention and self-integrity or pro-environmental self-identity. Thus the effect of the intervention did not interact with these variables.

When testing hypothesis 1, it was established that higher levels of cognitive dissonance have a statistically significant positive effect on intentions to reduce meat consumption. Since the intervention is successful in increasing a dissonant state among participants, an indirect effect of the intervention on intention to reduce meat consumption is established. Therefore, it can be stated that the intervention used in this research was not successful in directly increasing the intention to reduce meat consumption. However, it was successful in inducing dissonance and subsequently increasing intentions to reduce meat consumption.

```
                                 Df Sum Sq Mean Sq F value  Pr(>F)   
CompositeIntegrity                1   1.42   1.418   0.875 0.35127   
Intervention                      1  14.36  14.356   8.857 0.00347 **
Gender                            1  11.93  11.925   7.358 0.00757 **
CompositeEnvironment              1   0.82   0.821   0.506 0.47802   
Context                           1   0.00   0.003   0.002 0.96583   
CompositeIntegrity:Intervention   1   0.04   0.036   0.022 0.88250   
Intervention:CompositeEnvironment 1   4.75   4.748   2.930 0.08931 . 
Intervention:Context              1   1.37   1.365   0.842 0.36044   
Residuals                       132 213.94   1.621                   
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Table 8: Alternative exploring

Since these variables were not normally distributed, again a Kruskal-Wallis test is conducted. The results of this tested showed a statistically significant effect (chi-squared = 8.20, p = 0.004). At the significance level of 0.05 it can be concluded that the intervention had a significant effect on cognitive dissonance. This align with the results drawn from the ANOVA analysis. The results of the Kruskal-Wallis test can be found in Appendix C.

5. Discussion

5.1. Key findings

This study focussed on how a cognitive dissonance intervention could be applied to influence the intention to reduce meat consumption. The intervention was built upon the hypocrisy paradigm. By making participants aware of the discrepancy between their values and behavior, it was intended to arouse cognitive dissonance, resulting in an increased intention to reduce meat consumption. As can be seen in the result section, there was a strong positive relationship between cognitive dissonance and the intention to reduce meat consumption. This relationship indicates that a higher level of cognitive dissonance is related to higher intentions to reduce meat consumption

Furthermore, it was tested whether the intervention had a direct effect on the intention to reduce meat consumption. In testing the hypotheses, the variables self-integrity, pro-environmental self-identity, and the different contexts were accounted for. It was hypothesized that a higher level of self-integrity as well as a stronger pro-environmental self-identity would increase the effectiveness of the intervention. Surprisingly no significant direct effects of the intervention were found, nor interaction effects with the variables. This was unexpected since other research found that people with a stronger pro-environmental self-identity were more affected by value activation through animal welfare (Bouwman et al., 2022). Thus this research expected the same effects. Furthermore, openly propagating a certain target behavior and failing in adhering to that target behavior would make a hypocrisy intervention most effective (Freijy & Kothe, 2013; Aronson et al., 1991). The results of this research however show that the social context was not significant in the relationship between the intervention and intention to reduce meat consumption.

It was however found that pro-environmental self-identity, self-integrity, and gender had a significant positive effect on the intention to reduce meat consumption. This indicates that people who care more about the environment or attach more value to self-integrity, in general, have a higher intention to reduce meat consumption. Furthermore, it was found that gender also had a positive significant relationship. Hence, being female is associated with experiencing more dissonance and a higher intention to reduce meat consumption. Since the direct effects of the intervention did not appear to be significant, the effect of the intervention on cognitive dissonance was measured. Interaction effects were incorporated and this analysis yielded that the intervention has a direct positive significant relationship with dissonance.

Since it is a between-subject design, cautiously can be stated that the intervention resulted in higher feelings of dissonance.

5.2. Theoretical implications

This study showed that there is a positive significant effect of cognitive dissonance on the intention to reduce meat consumption. With cognitive dissonance, the psychological discomfort of eating meat in the future was measured. Since more research with direct measurements of cognitive dissonance was required (Harguess et al., 2020), this study has added to the body of knowledge already available. The positive significant relationship between cognitive dissonance and intention to reduce meat consumption aligns with existing literature. Literature found that a higher level of cognitive dissonance, results in a higher urge to decrease the dissonance and reach a consonant state, which can be done by behavior change (Weingarten & Lagerkvist, 2023; Bouwman et al., 2022). Other research also stated that the easiest way to cope with psychological discomfort is changing behavior (Stone & Fernandez, 2008). This research aligns with the research of Weingarten & Lagervist (2023), confirming that a higher level of cognitive dissonance pairs with a higher intention to reduce the dissonant state. It is important to remember that a causal relationship was not established, but a strong positive correlation. However, based on the existing research (Weingarten & Lagerkvist, 2023; Bouwman et al., 2022), it is likely that the feelings of dissonance resulted in a higher intention to decrease meat consumption.

Furthermore, existing literature found that gender can be important to incorporate in the analysis. Cognitive dissonance interventions have proved to be more successful for women than men (Dowsett et al., 2018; Benningstad & Kunst, 2020). This research, unfortunately, did not find a significant effect of gender on the intervention. However, a positive statistically significant relationship was established between gender on cognitive dissonance and intention to reduce meat consumption. A possible explanation could be that women have more disgust and disapproval of eating meat (Rothgerber, 2020). Thus, in general, they experience more dissonance and originally have a higher intention to reduce meat consumption.

This research also aimed to test whether the effects of the intervention differ for different contexts. By informing half of the participants a that their responses might be shared with other participants, a social context was created. This research, however, did not find a significant interaction effect of the social context and the intervention. This was unexpected since other research did find significant effects. In other research, the hypocrisy paradigm was most effective when people openly propagated something and then were reminded of their past failures adhering to that behavior (Freijy & Kothe, 2013; Aronson et al., 1991). Possibly, the social context was not significant in this research because it did not become salient enough. Other research convinced participants that they openly had to speak (Aronson et al., 1991), whereas this research informed participants that their answers could be shared with other participants. Therefore, the social and non-social context that was created, might not have differed enough from each other to have the desired effect. Subsequently, for further research it might be important to make the social context more salient in testing the effects of the different context. Another explanation could be that eating meat is generally accepted (Šedová et al., 2016), and, people are less influenced by social context. Another reason could be that the virtual setting in which the experiment is conducted is unable to create a salient social context.

In addition, it was measured whether self-integrity values and pro-environmental self-identity influenced the effects of the intervention. Earlier research found that choosing a meat option over a vegetarian option resulted in high levels of psychological discomfort for people with a strong pro-environmental self-identity (Bouwman et al., 2022). Hence it was expected that the intervention of this research would be more effective for people with a strong pro-environmental self-identity. Surprisingly, pro-environmental self-identity did not have any significant effects on cognitive dissonance and did not have significant interaction effects with the intervention. It did however have a strong positive relationship with the intention to reduce meat consumption. Furthermore self-integrity values were expected to have a significant interaction effect with the intervention, since people see hypocrisy as a threat to their self-belief about sincerity and honesty (Stone & Fernandez, 2008). Again no effect on cognitive dissonance, nor interaction effects with the intervention were found. Self-integrity and pro-environmental self-identity did however have a strong positive relationship with intention to reduce meat consumption. This could be a possible explanation why the intervention did not have a significant direct effect. People that attached more value to it could already have a higher intention to reduce meat consumption, decreasing the effect of the intervention. Another explanation could be that student do not experience eating meat as wrong, but aware of the environmental and ethical consequences (Šedová et al., 2016). Therefore it might not have an effect on cognitive dissonance.

Since no significant effects of the intervention on the intention to eat meat were found, the effect on cognitive dissonance was tested. In contradiction to the intention to reduce meat consumption, the intervention did have a significant positive effect on cognitive dissonance.

This aligns with previous research that found that induced hypocrisy can arouse cognitive dissonance (Rothgerber, 2020; Hocquette, 2023; Aronson et al, 1991). Self-integrity, pro-environmental self-identity and context did not yield any significant results in this analysis on cognitive dissonance. It was however established that making participants aware of the discrepancy between their values and behavior resulted in psychological discomfort. Since it was a between-subject design it can be established that cognitive dissonance increased due to the intervention. Since cognitive dissonance has a strong positive relationship with intention to reduce meat consumption, it can cautiously be stated that increasing the cognitive dissonance results in higher intentions to reduce meat consumption. Other research was also successful in using hypocrisy to increase intentions (Aronson et al., 1991). Thus making people aware of their hypocrisy might be a tool in increasing intentions to change behavior.

5.3. Practical implications

The results of this study also provide practical implications. First of all, this research showed that using hypocrisy is an effective way to create cognitive dissonance. For policy-makers, hypocrisy could be used as a tool to raise internal conflicts about meat consumption among consumers. Subsequently this can be used to promote a behavior change that reduces the consumption of meat. Earlier research has found that cognitive dissonance can be used in stimulating environmental friendly behaviors (Thøgersen, 2004). This research showed that it can indeed motivate a beneficial change in pro-environmental intentions. Furthermore, this research found that there are significant positive relationships of self-integrity and pro-environmental self-identity on intention to reduce meat consumption. For policy-makers these can be important values to take into account when tailoring an intervention to promote behavior change. Finally, this research showed that gender is an has very strong relationship with cognitive dissonance and intention to reduce meat consumption. This can be important to take into account when creating campaigns for reducing meat consumption. Different factors might influence people in different ways, and this can influence the effectiveness of policies. This could be a valuable tool for policymakers as it can raise internal conflicts among meat consumption of consumers.

5.4. Limitations and future research

The research conducted also comes with several limitations. First of all, since the results of the study were self-reported, this study is subject to social desirability bias. This entails that the respondents could have been influenced by what they think is socially desired to answer. This could have increased, for instance, the respondents values regarding the animal welfare questions or dissonance values, which can hamper with the validity of the results. Due to social desirability bias, people could report a higher intention to reduce meat consumption, regardless of the intervention. Therefore, the assessment of the intervention might be biased.

Furthermore, there are issues with the generalizability of this research. The research was conducted for a very specific sample which contains high educated students between the age of 18 and 25. Therefore, the results of this research cannot be generalized to the entire population. There has to be a caution to generalize these results for, for instance, different age groups or people with other socio-economic backgrounds. Also, a relatively small sample was used for this research. Further research could incorporate larger and different samples in the research to see the effects of the intervention. This could draw a more extensive view of how cognitive dissonance interventions could impose behavior change, and, therefore increase the external validity of such an intervention.

In addition, this research was conducted through an online experiment. This online experiment tested the values of the respondents, their cognitive dissonance and their intention to reduce meat consumption. There can, however, no statements be made if these intentions to reduce meat consumption result in actual behavior change. People can state that they are willing to eat less meat, but actually could not live up to these intentions. Hence future studies could conduct research over time to see if people really did decrease their meat consumption. This could be advantageous because Jalil et al. (2020) discovered that teaching students in a virtual setting on the environmental consequences of meat consumption lowered their intention to eat meat but did not result in actual behavior change. Hence this intervention might not be adequate in actually changing behavior. Furthermore, because this research was conducted in an online environment, the social context possibly did not become salient. Further research could test if this intervention works by, for instance, conducting it in a real-life experiment. This could make the social norms more salient and could influence the intervention.

Additionally, there can also be factors that influence the dependent variable that are not incorporated in the model. An example that could influence intention to reduce meat consumption is for instance price of meat. This could possibly have influence on the intentions to reduce meat consumption, especially for people with different socioeconomic status. Hence further research could think of other factors that influence cognitive dissonance and meat consumption. This could extent the view of how meat consumption can be affected.

Furthermore, the intervention was based on a trigger between values and behavior. This resulted in some respondents being excluded from the analysis because the intervention message was not triggered. Therefore valuable answers were not incorporated in the analysis. The intervention was not triggered because participants, for instance, did not attach much value to animal welfare. Therefore their behavior aligned with their values and they could not be made aware of a discrepancy between their beliefs and behavior. Subsequently, the cognitive dissonance intervention is not useful for this group. Further research could focus on how these people can be influenced to reduce their meat consumption behavior. Also, since answering the questions was not mandated in the survey, there were some missing values that had to be generated using Multivariate imputation by chained equations. The exclusion as well as the generated responses decrease the internal validity of the research. Additionally, due to the lack of reverse questions in the survey, forms of straight lining in the answers were accepted, which can also hamper with the internal validity of the research.

Finally, one of the assumptions of the ANOVA analysis is that there is independence of observations. Since the survey was distributed in a particular social group, it is likely that there were much similarities between the characteristics of the respondents. Therefore, the respondents could be very similar, again reducing the external validity of the research. Further research could take this into account by creating a sample that can better represent the entire population.

6. Concluding remarks

The use of cognitive dissonance has increasingly been used to influence behavior. With cognitive dissonance, the values and behavior of individuals diverge, which creates a situation of psychological discomfort. Individuals tend to have the urge to decrease this psychological discomfort by either changing their behavior or changing their attitudes. This research took into account the cognitive dissonance theory and hypocrisy paradigm to influence the intention to reduce meat consumption among students. The aim of this study was to create psychological discomfort, with the aim to increase the intention to reduce meat consumption. In doing so, partipants were made aware of their hypocrisy in both a social and non-social context. The results of this study show that cognitive dissonance and intention to reduce meat consumption have a strong significant positive relationship. A higher psychological discomfort is therefore related to a higher intention to change behavior. Values of self-integrity and pro-environmental self-identity appeared to have a significant strong relation with intention to reduce meat consumption, and are therefore important factors to consider. This research yielded no direct effect of the intervention on the intention to reduce meat consumption. Furthermore the context in which the intervention took place did not have a significant effect either. However, an indirect effect on the intention to reduce meat consumption was established. There was a strong statistically significant effect of the intervention on cognitive dissonance. Since the research was conducted in a between-subject design it can be stated that making people aware of their hypocrisy, increases psychological discomfort. The psychological discomfort, subsequently, has a strong positive relationship with intention to reduce meat consumption. Thus, cautiously can be concluded that induced hypocrisy can be used in increasing the intention to reduce meat consumption.

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Appendices

Appendix A Reliability analysis

Reliability analysis Cognitive Dissonance

```
Reliability analysis
Call: psych::alpha(x = Final_dataset[c("Relaxeddisstressed", "EasyUneasy",
    "ComfortableUncomfortable", "PleasedBothered", "CalmUpset")],
    check.keys = F)

  raw_alpha std.alpha G6(smc) average_r S/N    ase mean  sd median_r
      0.94      0.94    0.94      0.77  16 0.0078  3.1 1.3     0.78

    95% confidence boundaries
         lower alpha upper
Feldt     0.93  0.94  0.96
Duhachek  0.93  0.94  0.96

 Reliability if an item is dropped:
                         raw_alpha std.alpha G6(smc) average_r S/N alpha se   var.r med.r
Relaxeddisstressed            0.93      0.93    0.92      0.77  13   0.0098 0.00357  0.79
EasyUneasy                    0.93      0.93    0.91      0.76  12   0.0104 0.00278  0.77
ComfortableUncomfortable      0.93      0.93    0.92      0.76  13   0.0101 0.00467  0.79
PleasedBothered               0.94      0.94    0.92      0.79  15   0.0085 0.00053  0.79
CalmUpset                     0.92      0.92    0.90      0.75  12   0.0109 0.00423  0.74
```

Reliability analysis Intention to reduce meat consumption

```
Reliability analysis
Call: psych::alpha(x = datacomplete[c("Consider", "Planning", "Absolutely")],
    check.keys = F)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean  sd median_r
      0.92      0.92    0.91       0.8  12 0.012  4.5 1.4     0.79

    95% confidence boundaries
         lower alpha upper
Feldt     0.89  0.92  0.94
Duhachek  0.89  0.92  0.94

 Reliability if an item is dropped:
           raw_alpha std.alpha G6(smc) average_r  S/N alpha se var.r med.r
Consider        0.88      0.88    0.79      0.79  7.5   0.0198    NA  0.79
Planning        0.82      0.82    0.70      0.70  4.6   0.0301    NA  0.70
Absolutely      0.95      0.95    0.90      0.90 17.9   0.0089    NA  0.90
```

Reliability analysis self-integrity

```
Reliability analysis
Call: psych::alpha(x = Final_dataset[c("Principal", "Ethic", "Moral")],
    check.keys = F)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.71      0.73    0.67      0.47 2.7 0.041  5.1 0.89     0.52

    95% confidence boundaries
         lower alpha upper
Feldt     0.61  0.71  0.78
Duhachek  0.63  0.71  0.79

 Reliability if an item is dropped:
          raw_alpha std.alpha G6(smc) average_r  S/N alpha se var.r med.r
Principal      0.71      0.73    0.57      0.57 2.67    0.046    NA  0.57
Ethic          0.67      0.68    0.52      0.52 2.15    0.054    NA  0.52
Moral          0.46      0.50    0.33      0.33 0.98    0.081    NA  0.33
```

Reliability analysis pro-environmental self-identity

```
Reliability analysis
Call: psych::alpha(x = Final_dataset[c("Identity", "Act", "Person")],
    check.keys = F)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean  sd median_r
      0.87      0.88    0.84       0.7   7 0.019  4.5 1.2     0.64

    95% confidence boundaries
         lower alpha upper
Feldt     0.83  0.87  0.91
Duhachek  0.84  0.87  0.91

 Reliability if an item is dropped:
         raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
Identity      0.90      0.90    0.82      0.82 9.3    0.016    NA  0.82
Act           0.78      0.78    0.64      0.64 3.6    0.037    NA  0.64
Person        0.78      0.78    0.64      0.64 3.5    0.037    NA  0.64
```

Reliability analysis welfare values

```
Reliability analysis
Call: psych::alpha(x = Final_dataset[c("Welfare", "Life")], check.keys = F)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.75      0.75     0.6       0.6   3 0.043  5.8 0.76      0.6

    95% confidence boundaries
         lower alpha upper
Feldt     0.65  0.75  0.82
Duhachek  0.66  0.75  0.83

 Reliability if an item is dropped:
        raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
Welfare      0.59       0.6    0.36       0.6 1.5       NA     0   0.6
Life         0.60       0.6    0.36       0.6 1.5       NA     0   0.6
```

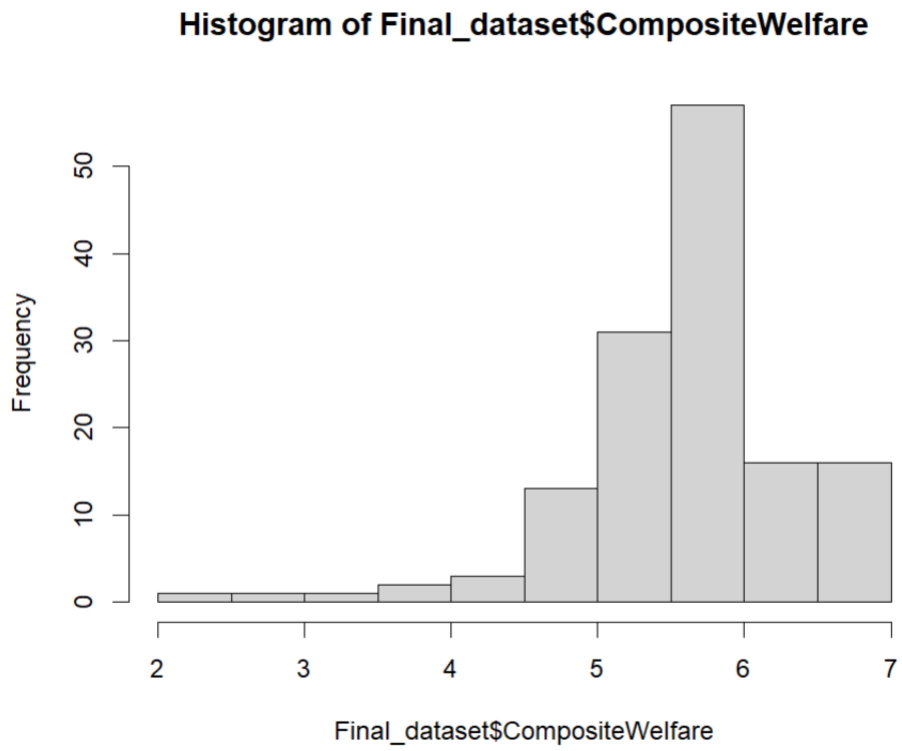
Appendix B Shapiro-Wilk normality test

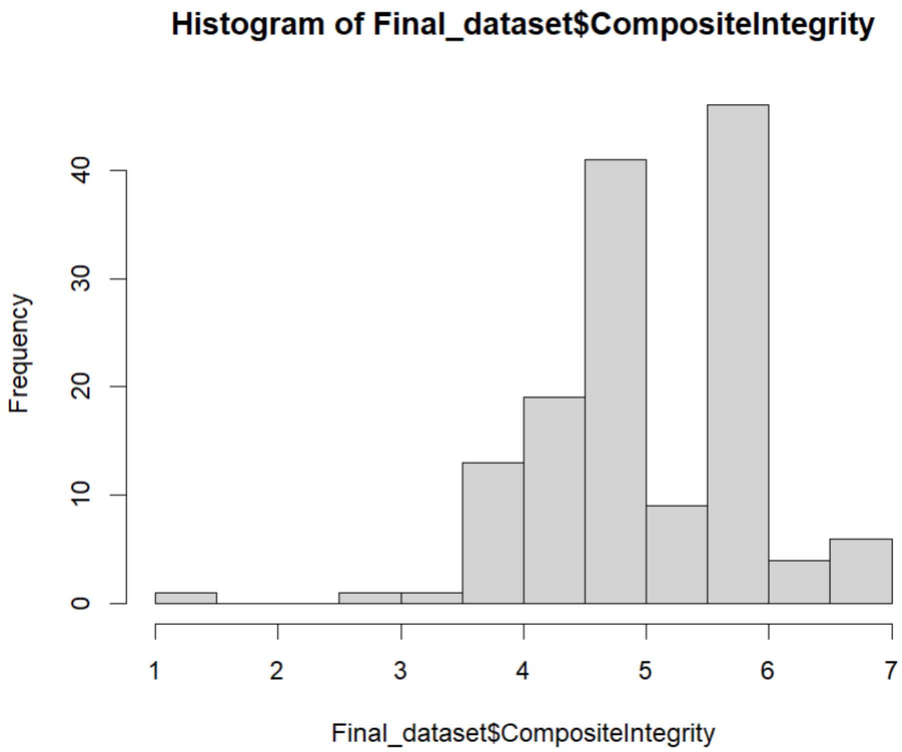
Shapiro-Wilk normality test

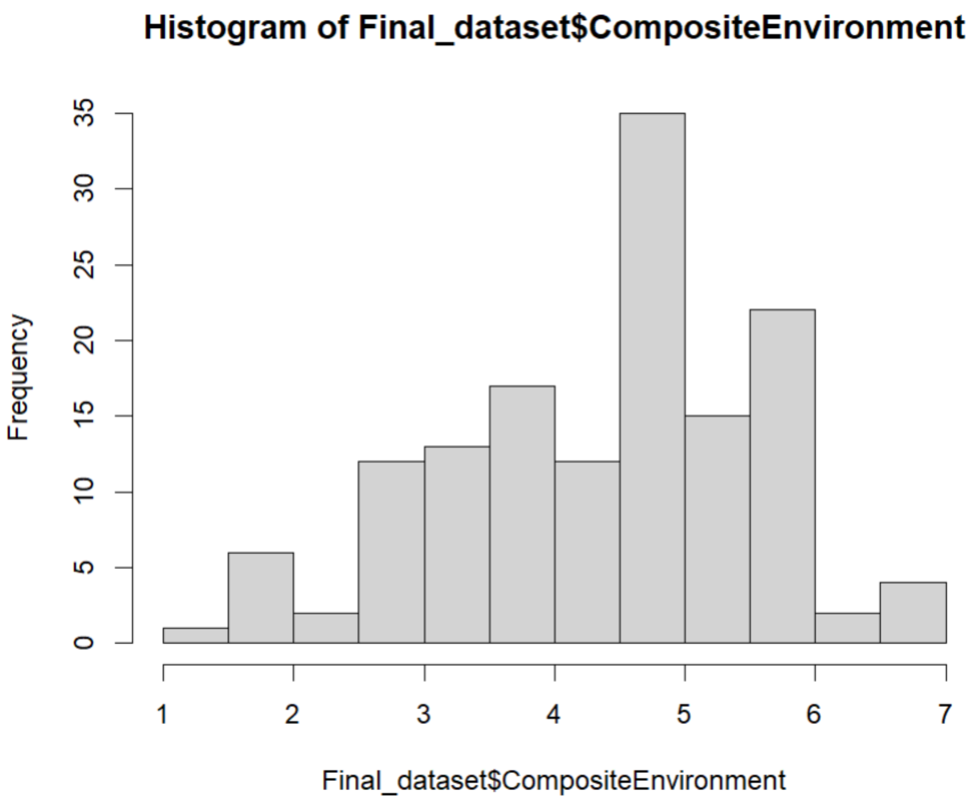
```
        Shapiro-Wilk normality test

data:  Final_dataset$CompositeWelfare
W = 0.85828, p-value = 2.586e-10

> shapiro.test(Final_dataset$CompositeIntegrity)

        Shapiro-Wilk normality test

data:  Final_dataset$CompositeIntegrity
W = 0.94607, p-value = 2.784e-05

> shapiro.test(Final_dataset$CompositeEnvironment)

        Shapiro-Wilk normality test

data:  Final_dataset$CompositeEnvironment
W = 0.97223, p-value = 0.005699

> shapiro.test(Final_dataset$CompositeDissonance)

        Shapiro-Wilk normality test

data:  Final_dataset$CompositeDissonance
W = 0.95764, p-value = 0.0002465

> shapiro.test(Final_dataset$CompositeIntention)

        Shapiro-Wilk normality test

data:  Final_dataset$CompositeIntention
W = 0.93604, p-value = 5.025e-06
```

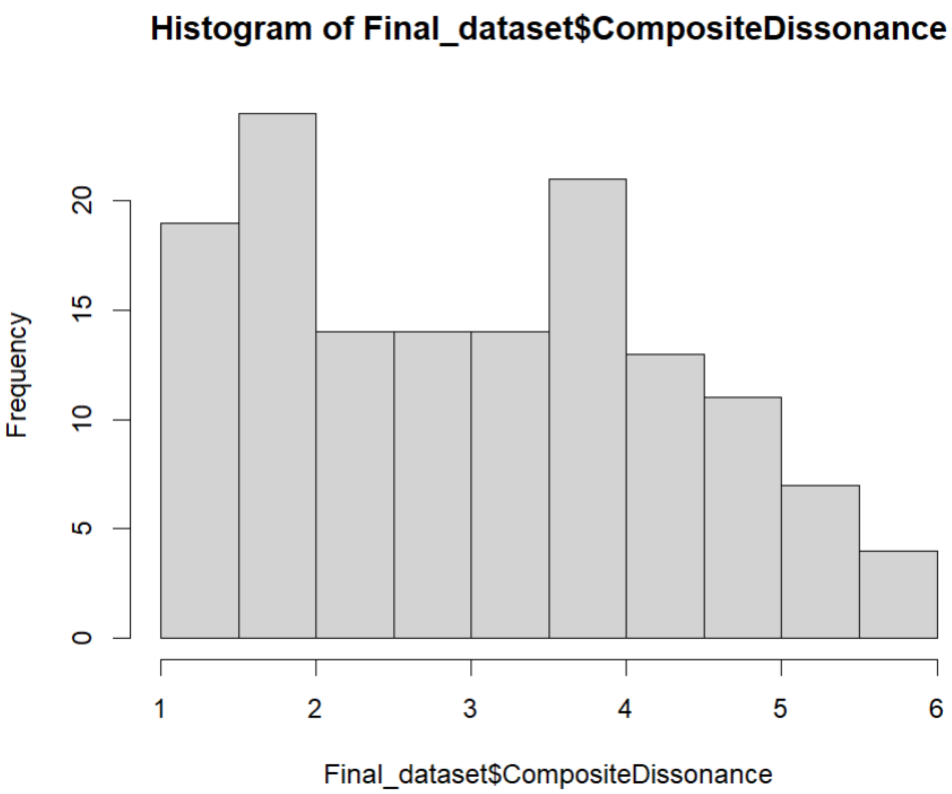
Levene's test of variance

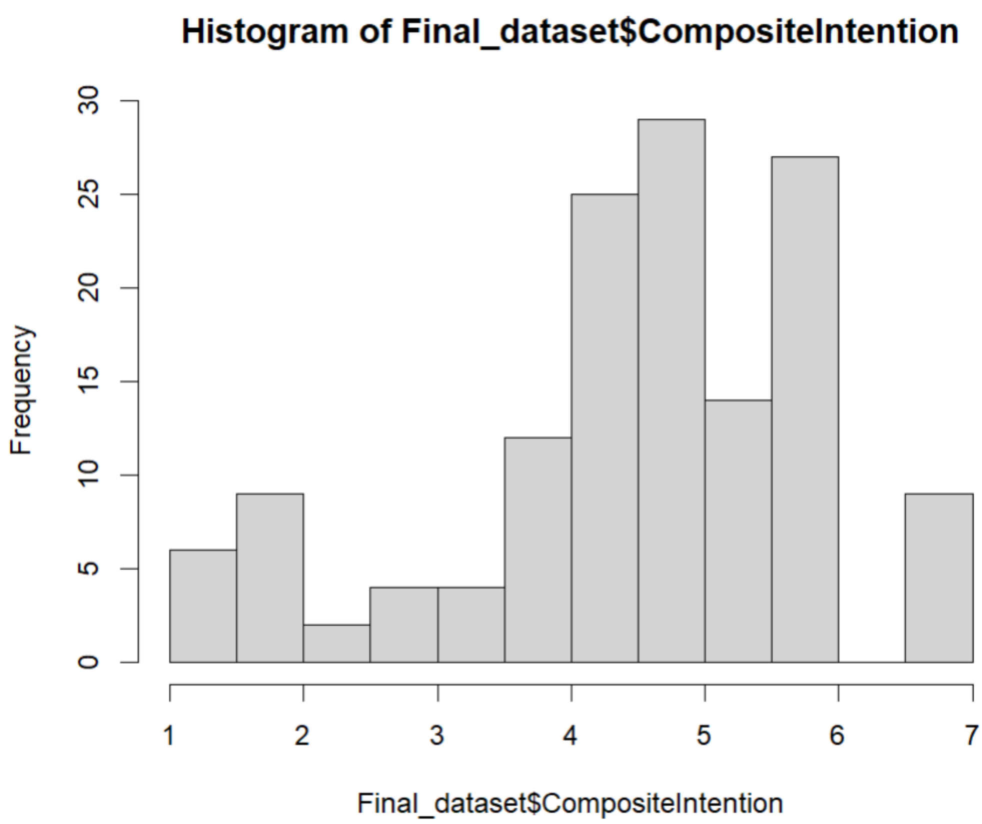
```
Levene's Test for Homogeneity of Variance (center = median)
       Df F value Pr(>F)
group   1  0.0107 0.9177
      139
```


Histogram of Final_dataset$CompositeWelfare
Frequency
0
10
20
30
40
50
2
3
4
5
6
7
Final_dataset$CompositeWelfare


Histogram of Final_dataset$CompositeIntegrity
Frequency
0
10
20
30
40
1
2
3
4
5
6
7
Final_dataset$CompositeIntegrity


Histogram of Final_dataset$CompositeEnvironment
Frequency
0
5
10
15
20
25
30
35
1
2
3
4
5
6
7
Final_dataset$CompositeEnvironment


Histogram of Final_dataset$CompositeDissonance
Frequency
0
5
10
15
20
1
2
3
4
5
6
Final_dataset$CompositeDissonance


Histogram of Final_dataset$CompositeIntention
Frequency
0
5
10
15
20
25
30
1
2
3
4
5
6
7
Final_dataset$CompositeIntention

Appendix C Kruskal-Wallis test

Hypothesis 1

```
        Kruskal-Wallis rank sum test

data:  CompositeIntention by CompositeDissonance
Kruskal-Wallis chi-squared = 52.894, df = 24, p-value =
0.0005975
```

Hypothesis 2

```
> # Perform Kruskal-Wallis test for the high self-integrity group
> kruskal.test(CompositeIntention ~ Intervention, data = Final_dataset[Fina
l_dataset$SelfIntegrityGroup == "High", ])

        Kruskal-Wallis rank sum test

data:  CompositeIntention by Intervention
Kruskal-Wallis chi-squared = 1.1852, df = 1, p-value = 0.2763

> # Perform Kruskal-Wallis test for the low self-integrity group
> kruskal.test(CompositeIntention ~ Intervention, data = Final_dataset[Fina
l_dataset$SelfIntegrityGroup == "Low", ])

        Kruskal-Wallis rank sum test

data:  CompositeIntention by Intervention
Kruskal-Wallis chi-squared = 0.11263, df = 1, p-value = 0.7372
```

Hypothesis 3

```
        Kruskal-Wallis rank sum test

data:  CompositeIntention by Intervention
Kruskal-Wallis chi-squared = 1.6916, df = 1, p-value = 0.1934

> # Intervention: A, Social Context: Y
> kruskal.test(CompositeIntention ~ Intervention, data = Final_dataset[Fina
l_dataset$Context == "1", ])

        Kruskal-Wallis rank sum test

data:  CompositeIntention by Intervention
Kruskal-Wallis chi-squared = 0.3462, df = 1, p-value = 0.5563

> # Intervention: B, Social Context: X
> kruskal.test(CompositeIntention ~ Intervention, data = Final_dataset[Fina
l_dataset$Context == "0", ])

        Kruskal-Wallis rank sum test

data:  CompositeIntention by Intervention
Kruskal-Wallis chi-squared = 1.6916, df = 1, p-value = 0.1934

> # Intervention: B, Social Context: Y
> kruskal.test(CompositeIntention ~ Intervention, data = Final_dataset[Fina
l_dataset$Context == "1", ])

        Kruskal-Wallis rank sum test

data:  CompositeIntention by Intervention
Kruskal-Wallis chi-squared = 0.3462, df = 1, p-value = 0.5563
```

Hypothesis 4

```
        Kruskal-Wallis rank sum test

data:  CompositeIntention by Intervention
Kruskal-Wallis chi-squared = 1.4729, df = 1, p-value = 0.2249

> # Perform Kruskal-Wallis test for the low self-integrity group
> kruskal.test(CompositeIntention ~ Intervention, data = Final_dataset[Fina
l_dataset$EnvironmentGroup == "Low", ])

        Kruskal-Wallis rank sum test

data:  CompositeIntention by Intervention
Kruskal-Wallis chi-squared = 0.25592, df = 1, p-value = 0.6129
```

Alternative exploring

```
        Kruskal-Wallis rank sum test

data:  CompositeDissonance by Intervention
Kruskal-Wallis chi-squared = 8.1995, df = 1, p-value = 0.00419
```

Appendix D: Survey questions

Survey final version

Start of Block: Welkomsttekst

Q1 Welkom! Bedankt dat je deel wil nemen aan mijn onderzoek. Dit onderzoek gaat over vleesconsumptie en de resultaten zullen gebruikt worden voor mijn masterscriptie. De deelname aan deze enquête is geheel vrijwillig en je hebt de keuze om de enquête op elk moment te beëindigen. De verzamelde gegevens zullen vertrouwelijk worden behandeld.

In de enquête zullen enkele vragen gesteld worden over vleesconsumptie en jouw standpunt hierin. Ik wil je vragen de gestelde vragen zoveel mogelijk naar waarheid in te vullen. Het invullen van de enquête duurt ongeveer 5 minuten. Mochten er nog vragen zijn naar aanleiding van de enquête kan je me mailen op: T.Venema@student.ru.nl.

Ik wil je alvast hartelijk danken voor je tijd en waardevolle bijdrage aan deze enquête.

Mocht je het onderzoek invullen via surveyswap, de credits worden gegeven aan het einde van de survey.

Eerst zullen er wat standaard vragen volgen.

End of Block: Welkomsttekst

Start of Block: demografische vragen

Q2 Met welk gender identificeer je jezelf?

- ○ Man
- ○ Vrouw
- ○ Anders
- ○ Zeg ik liever niet

Q3 Hoe oud ben je?

- ○ 18
- ○ 19
- ○ 20
- ○ 21
- ○ 22
- ○ 23
- ○ 24
- ○ 25
- ○ Anders

Q5 Ben je momenteel student?

- ○ Ja
- ○ Nee

Q6 Aan welke instantie studeer je?

- ○ Hogeschool
- ○ Universiteit

Q7 Eet je vlees?

- Ja, vaak (dagelijks)
- Ja, regelmatig (meer dan 3x per week)
- Soms (1-3x per week)
- Nee

End of Block: demografische vragen

Start of Block: Blok non-social context

Q8 De volgende sectie gaat over je individuele waarden omtrent dierenwelzijn en vleesconsumptie. Het is belangrijk dat je de vragen invult aan de hand van je eigen normen en waarden. De antwoorden zullen volledig anoniem blijven en niet worden gedeeld.
Probeer de vragen zo veel mogelijk naar waarheid in te vullen

Q9 Geef bij de volgende vragen aan in hoeverre je het belangrijk vindt

	Sterk mee oneens	Mee oneens	Ietwat mee oneens	Neutraal	Ietwat mee eens	Mee eens	Sterk mee eens
Ik vind dierenwelzijn belangrijk	○	○	○	○	○	○	○
Ik vind het belangrijk dat dieren een goed leven hebben gehad voordat ze worden geslacht	○	○	○	○	○	○	○
Ik denk aan het dier wanneer ik vlees koop in de supermarkt	○	○	○	○	○	○	○
Over het algemeen heb ik het gevoel dat ik handel aan de hand van mijn principes en waarden	○	○	○	○	○	○	○
Ethisch verantwoord handelen vind ik belangrijk	○	○	○	○	○	○	○
Ik voel morele verantwoordelijkheid in mijn beslissingen en handelingen	○	○	○	○	○	○	○
Milieuvriendelijk zijn is een belangrijk onderdeel van wie ik ben	○	○	○	○	○	○	○
Over het algemeen handel ik milieuvriendelijk	○	○	○	○	○	○	○
Ik beschouw mezelf als een milieuvriendelijk persoon	○	○	○	○	○	○	○

End of Block: Blok non-social context

Start of Block: Blok sociale context

Q10 De volgende sectie gaat over je individuele waarden omtrent dierenwelzijn en vleesconsumptie.

Graag wil ik je erop wijzen dat de antwoorden die je verstrekt in deze enquête mogelijk gedeeld kunnen worden met andere deelnemers van de enquête. Dit is nodig om meerdere perspectieven te krijgen binnen deze studie.

Ik wil je vragen om de volgende vragen te beantwoorden.

Q11 Ga je er mee akkoord dat je antwoorden mogelijk worden gedeeld met andere deelnemers van dit onderzoek?

◯ Ja (Graag voor en achternaam invoeren) ____

Q12 Geef bij de volgende vragen aan in hoeverre je het belangrijk vindt

	Helemaal mee oneens	Mee oneens	Ietwat mee oneens	Neutraal	Ietwat mee eens	Mee eens	Sterk mee eens
Ik vind dierenwelzijn belangrijk	○	○	○	○	○	○	○
Ik vind het belangrijk dat dieren een goed leven hebben gehad voordat ze worden geslacht	○	○	○	○	○	○	○
Ik denk aan het dier wanneer ik vlees koop in de supermarkt	○	○	○	○	○	○	○
Over het algemeen heb ik het gevoel dat ik handel aan de hand van mijn principes en waarden	○	○	○	○	○	○	○
Ethisch verantwoord handelen vind ik belangrijk	○	○	○	○	○	○	○
Ik voel morele verantwoordelijkheid in mijn beslissingen en handelingen	○	○	○	○	○	○	○
Milieuvriendelijk zijn is een belangrijk onderdeel van wie ik ben	○	○	○	○	○	○	○
Over het algemeen handel ik milieuvriendelijk	○	○	○	○	○	○	○
Ik beschouw mezelf als een milieuvriendelijk persoon	○	○	○	○	○	○	○

End of Block: Blok sociale context

Start of Block: blok control group

Q21 Graag wil ik je vragen de volgende vragen in te vullen

End of Block: blok control group

Start of Block: Interventie blok behavior

Q13 In deze sectie wil ik je wat vragen stellen over jouw eigen consumptie gedrag. Ik wil je vragen om deze vragen zo veel mogelijk naar waarheid in te vullen.

Q14 Hoevaak heb je afgelopen 7 dagen vlees gegeten

- Minder dan 3
- 3-4 keer
- 5-6 keer
- meer dan 7 keer

Q15 Heb je de afgelopen 7 dagen bewust biologisch vlees gekocht omdat deze dieren in betere omstandigheden hebben geleefd?

- Ja
- Nee

Q16 Heb je in de afgelopen 7 dagen er een keer bewust voor gekozen geen vlees te eten?

- Ja
- Nee

End of Block: Interventie blok behavior

Start of Block: Interventie message

Q20 Graag wil ik je aandacht vragen voor een kwestie die te maken heeft met je persoonlijke waarden en gedrag. Uit het onderzoek blijkt dat je een sterke waarde hecht aan het welzijn van dieren. Het is echter interessant om te zien dat er een tegenstrijdigheid bestaat tussen deze waarden en je consumptie gedrag van vlees. Ondanks de positieve intenties op het gebied van dierenwelzijn valt het op dat er een kloof bestaat tussen wat je belangrijk vindt en hoe je handelt.

Graag wil ik je vragen de volgende vragen in te vullen.

End of Block: Interventie message

Start of Block: Dissonantie blok

Q18 Hoe voel je je over je eigen vleesconsumptie?

	1	2	3	4	5	6	7	
Ontspannen	○	○	○	○	○	○	○	Gespannen
Gemakkelijk	○	○	○	○	○	○	○	Ongemakkelijk
Comfortabel	○	○	○	○	○	○	○	Oncomfortabel
Tevreden	○	○	○	○	○	○	○	verhinderd
Content	○	○	○	○	○	○	○	Beschaamd

End of Block: Dissonantie blok

Start of Block: Intentie blok

Q19 Als je nadenkt over de toekomst, welke van onderstaande is waarschijnlijk?

	Sterk mee oneens	Mee oneens	Ietwat mee oneens	Neutraal	Ietwat mee eens	Mee eens	Sterk mee eens
Ik overweeg minder vlees te gaan eten	○	○	○	○	○	○	○
Ik ben van plan om minder vlees te gaan eten	○	○	○	○	○	○	○
Ik ga absoluut minder vlees eten	○	○	○	○	○	○	○

End of Block: Intentie blok

Start of Block: Einde survey

Q30 Ik wil je bedanken voor je tijd, dit is het einde van de survey. Mocht je nog vragen ben ik te bereiken op: T.Venema@student.ru.nl.

Mocht je de survey ingevuld hebben via surveyswap:
The following code gives you credits that can be used to get free research participants at SurveySwap.io. Go to: https://surveyswap.io/sr/JV3F-H1RI-Q85Z Or, alternatively, enter the code manually: JV3F-H1RI-Q85Z

Dank voor je deelname!

End of Block: Einde survey