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"Even if it will upset me, I would want to know": Climate change and health messages framing effects on information avoidance and intention to reduce meat consumption

Dissertação apresentada à Universidade/ Católica Portuguesa para obtenção do grau de mestre em Psychology in Business and Economics

Por

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(November 2020)

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Sob orientação de Dr. Rui Gaspar

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Abstract

Despite rising scientific evidence that the climate crisis demands attention and action, presenting climate change information has had ironic effects, sometimes inducing attitude changes and sometimes inducing people to reject such information. Due to the ironic negative effects, it was hypothesised that framing a messaging on red meat consumption risks as a climate change issue, would increase information avoidance and decrease intention to reduce meat consumption (Lu, McComas & Besley, 2017). Moreover, interpersonal resources were predicted to function as a positive moderator, attenuating the message framing effect on both information avoidance and the intention to reduce red meat consumption (Sheppard & Howell, 2014). 209 participants from a Portuguese and a non-Portuguese sample, filled out a web-based survey with an experimental design, being randomly assigned to either a Control, Climate Change or Health frame condition. Survey measures included their attitudes towards and risk perception of climate change and red meat consumption, climate change events exposure and perceived social support, climate change information and health information avoidance and intentions to reduce meat consumption. Results showed no message frame effects nor moderator effect of social support. Further exploratory analysis revealed that attitudes towards eating meat served as negative predictor of intention to reduce red meat consumption; while risk perception of climate change was found to be a negative predictor of climate change information avoidance, particularly in the Portuguese sample. The findings' present preliminary implications for climate change communication, namely the need to increase risk awareness as a potential way to decrease information avoidance.

Keywords: Message Framing, Climate Change, Risk Perception, Red meat consumption, Climate Change communication

Abstrato

Apesar da crescente evidência científica de que a crise climática exige atenção e acção, apresentar informação sobre as alterações climáticas tem tido efeitos irónicos, induzindo por vezes mudanças de atitude e induzindo por vezes as pessoas a rejeitar tal informação. Devido aos efeitos negativos irónicos, foi levantada a hipótese de que o enquadramento de uma mensagem sobre os riscos do consumo de carne vermelha como uma questão de mudança climática, aumentaria a evasão de informação e diminuiria a intenção de reduzir o consumo de carne (Lu, McComas & Besley, 2017). Além disso, previa-se que os recursos interpessoais funcionassem como um moderador positivo, atenuando o efeito de enquadramento de mensagens tanto na prevenção de informação como na intenção de reduzir o consumo de carne vermelha (Sheppard & Howell, 2014). 209 participantes de uma amostra portuguesa e não portuguesa, preencheram um inquérito baseado na web com um desenho experimental, sendo aleatoriamente atribuídos quer a condições de controlo, alterações climáticas ou saúde. As medidas do inquérito incluíram as suas atitudes e perceção do risco das alterações climáticas e do consumo de carne vermelha, exposição aos eventos das alterações climáticas e perceção do apoio social, informação sobre as alterações climáticas e prevenção de informação sanitária e intenções de reduzir o consumo de carne. Os resultados não mostraram efeitos de enquadramento de mensagens nem efeito moderador do apoio social. Outras análises exploratórias revelaram que as atitudes em relação ao consumo de carne serviram como preditor negativo da intenção de reduzir o consumo de carne vermelha; enquanto a perceção do risco das alterações climáticas foi considerada como um preditor negativo da prevenção da informação sobre as alterações climáticas, particularmente na amostra portuguesa. As conclusões apresentam implicações preliminares para a comunicação sobre as alterações climáticas, nomeadamente a necessidade de aumentar a consciência do risco como uma forma potencial de diminuir a evasão de informação.

Palavras-chave: Enquadramento de mensagens, Alterações climáticas, Perceção do risco, Consumo de carne vermelha, Comunicação sobre as alterações climáticas

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Introduction

Climate Change

Over the last years, it has been nearly impossible to read the news without a reference that is in some relation to climate change, sometimes also referred to as the climate crisis or global warming. Climate change is very high up on the current political agenda in countries all-over the planet, and the past decade has seen an explosion of rising scientific evidence that the crisis demands our immediate attention and action (Markowitz & Guckian, 2018). Various sources claim that global warming poses an existential risk, as it will likely be the greatest cause of species extinction this century and a great threat to our ecosystem (World Wildlife Fund, 2020). However, it appears that the public is still polarised about the importance of climate change, and especially the human role in it (Petrovic, Mardigano & Zaval, 2014).

While ostensibly omnipresent, climate change is often perceived as a topic that does not relate to individuals personally, and therefore, as something many people may perceive as psychologically distant to them. It has been suggested that communicators should aim to frame climate change messages to reduce psychological distance and increase public engagement (Jones, Hine & Marks, 2016).

Research shows that people sometimes cope with threatening information by proactively avoiding it, be it because of the information itself or because it may lead to undesirable behaviours that have to be undertaken as a consequence (Howell & Shepperd 2013a). This coping mechanism is referred to as information avoidance. There is some evidence that instrumental and emotional value can influence the way climate change information is processed. One study (Yang & Kahlor, 2013) found that information avoidance is driven by positive affect, as in individuals who feel positive or optimistic about climate change may avoid more information that could make them change their

mind, such as media bringing attention about its dangers and consequences in the near future. On the other hand, the authors have suggested that information seeking is motivated by negative affect, since in that case one wants more information to assess how imminent the threat is. The authors also state that informational subjective norms were positively related to both information avoidance and seeking and conclude that social environment can influence the way one processes climate change information.

While undoubtedly a subject that most people are exposed to and familiar with, a secondary analysis of twenty-two interviews with UK-based residents aimed to learn about people's interpretations of the term climate change impacts" as well as "adaptations" (Harcourt, Bruine de Bruin, Dessai & Taylor, 2019). The researchers concluded that there was a lack of clarity about what the terms meant, however interviewees still expressed concerns that climate change threatens cultural norms and values. Corresponding to the scientific literature, climate change might be extensively covered by the media, but does unfortunately remain a subject of controversy and confusion as of today. Although most people do not outright deny climate change, there is still a lot of skepticism and the perception that the issue is being exaggerated. The literature suggests that skepticism is strongly influenced by political and environmental values rather than education (Whitmarsh, 2011). In the US, people's polarisation about climate change has been studied in light of political attitude. Overall, a trend has been observed that liberals are inclined to blame human activity to the severity of increasing climate-change, while conservatives are less willing to make that association. It has been argued that this is partly due to people's tendency to reject information that is not in line with their existing beliefs, a phenomenon that relates to directional motivated reasoning (Druckman & McGrath, 2019). In the last years, the „climate change discourse "has been increasingly focused on its relationship with meat consumption (particularly red meat), which has been shown to have the ability to trigger the „directional motivated reasoning "or defensive processing of information in this regard.

Pro-environmental Behaviour and Red Meat Consumption

While it is true that our planet has and always will experience a changing climate, and at times extreme weather changes, such as the often-forgotten Little Ice Age that occurred from the early 14th century through the mid-19th century, the focus in recent years has been the anthropogenic impact on the climate and the environment in general (Rafferty, 2016)

When talking about human-caused or anthropogenic climate change, there are arguably many human behaviours that contribute to the decline of the health of our eco system. It is striking to note that our food systems are not discussed in relation to climate change in the proportion that one might expect when taking a closer look at its effects on global warming. The UN general assembly convened in October 2019, and climate change was high on the agenda, with climate activist Greta Thunberg attending, who has for some time been a household name and face for a new generation of climate consciousness. But how what we put on our plates affects this crisis and the future of our environment overall was not deemed an important topic throughout the meeting (Milman, 2019).

Food relates to environmental degradation in many ways, the way it is produced and transported around the globe relates directly to biodiversity loss and deforestations such as in the Amazon rain forest. Within food production, one sector stands out as being especially resource-intensive and problematic: the way humans produce livestock, and particularly red meat. Red meat is a staple source of protein, iron and other micronutrients in many people's diets (World Cancer Research Fund, 2019). Red meat can be defined as all meats that have been obtained from mammals, containing more myoglobin than white meats or fish, which give it its colour (USDA, 2009). Red Meat can be consumed in processed form to improve taste and preservation, which can be achieved through curing, fermenting or smoking, often adding a lot of salt in the process. Examples of processed red meats include salami, bacon and many sausages. In the U.S., it is estimated that 60% of the meat eaten is red meat, with one quarter of the total meat consumption being processed meats such as bacon and sausages. Overall, the average adult in the US consumed 222 pounds of red meat and poultry in 2018. Their average monthly consumption contributes as much to global warming as a flight from New York to London would, and that is just the consumption of beef alone, discounting other meats (Friend, 2019). The amount of red meat consumed varies strongly between countries, and consumption is found to be especially high in OECED countries and Latin America (OECD, 2019). Overall, low-

income countries consume much less of it than high-income countries, but the demand for red meat and other animal- sourced foods will only increase with the rising population of our planet (OECD/FAO, 2019).

Red meat consumption is widely studied in connection to environmental issues, with previous research showing that low consumption is strongly predicted by health and environmental beliefs (De Boer, Schösler & Aiking, 2017). Red meat is important to consider when talking about climate change. Food accounts for 15-30% of all greenhouse emissions (Esnauf, Russel & Bricas; 2013) and there is growing evidence that this impact could be significantly improved if people reduced their consumption of meat, and in particular of processed red meat. The production of livestock contributes greatly to climate change, highlighting that in fact it contributes to more greenhouse gas emissions than the global transport sector does (as well as being the greatest contributor for global methane emissions (Stea & Pickering, 2018). Despite the solid evidence on the environmental effects of red meat production, there is still not an adequate amount of research relating it to the effects of climate change. An analysis of leading Australian and US media content revealed less than 1% of articles featuring the topic "climate change" mentioned meat or livestock, which seems rather neglectful considering the greenhouse gas emissions resulting from that line of industry (Friedlander et al., 2014). One study presented participants with three food-related options with different mitigation goals where they subsequently had to rate their effectiveness and willingness to adopt. Findings revealed that only very few consumers recognised eating less meat as a climate-friendly option, 12 % of Dutch and 6% of the American sample (De Boer, Witt & Aiking, 2016).

Experts agree that a more sustainable, low-carbon diet would positively contribute to mitigating climate effects in the future, with some estimates stating that adopting such a diet globally could reduce negative climate change effects by around 50% by 2050 (Hedenus et al., 2014). Thus, it is important to find ways to motivate people to transition to a diet that contains less meat, as all evidence points to the conclusion that excessive red meat consumption is neither healthy for our bodies, nor for the environment. As part of the motivational strategies to encourage people to transition, risk communication could play such a motivational role through presenting information related to risk of meat consumption, including climate change related risks.

Information Avoidance

One would like to assume that people strive for knowledge and truth in life, but research has shown that this is not always the case. Depending on the circumstances, people can be motivated to practice information avoidance. Information avoidance refers to people's behaviour aiming to prevent or at least delay receiving information that is available but not wanted (Sweeny et al., 2010). This can be seen in everyday casual situations and has been a well-studied phenomenon in both field and laboratory experiments.

In finance, the term "ostrich effect" has been coined to describe investors' tendencies to avoid studying their financial portfolios when the stock market is down (Haltinner & Sarathchandra, 2018). People at risk for certain health conditions have also been found to sometimes avoid free medical tests, even though the information could be important or even lifesaving for them and help them make better decisions (Thornton, 2008).

Unsurprisingly, information avoidance can lead people to act in more selfish and less altruistic ways. An everyday example is the tendency of people from wealthy neighbourhoods to avoid poorer neighbourhoods of their city, while arguably facing those other residents' living conditions may induce guilt and compel wealthier ones to give to charity (Cain, Dana & Newman, 2014). Information avoidance can also lead to increased political polarisation, since people will not encounter information that could challenge their existing beliefs and instead focus their attention on outlets that perpetuate information in line with their views (Baldwin & Lammers, 2016). It has been suggested that this paralysis can interfere with implementations of advantageous legislation tackling important social issues such as climate change.

Research suggests a variety of different motivation for information avoidance. A study by Howell & Shepperd (2013a) found that people declined learning risk information, in the form of feedback, more when it could obligate highly undesirable behaviour (taking a cervical exam and depending on medication) compared with mildly undesirable behaviour (a cheek swap and medication intake for 2 weeks). The authors conclude that their findings relate obligation as a motive for information avoidance.

As previously mentioned, people tend to avoid information that is not in harmony with already existing beliefs. This is to avoid negative feelings of tension, discomfort and the likes that could subsequently arise from the resulting contradiction. This resulting cognitive dissonance has to be considered in science communication, especially with regards to risk communication, which generally involves serious and unpleasant information. In the context of reduction of red meat consumption, a study by Gaspar and colleagues (2016a) found that people who scored high in information avoidance decreased in the overall positivity of their attitudes and increased their perceived knowledge similarly to people scoring low in information avoidance.

Another study by Howell and Shepperd (2013b) in a personal health context tested whether making participants become aware of their reasoning for information avoidance beforehand, would reduce information avoidance. Results from three studies confirmed the desired reduction, unless the information sought after represented the inferior option, such as a medical condition that is untreatable. Especially with regards to information concerning one's health, it is comprehensible that daunting news are exceptionally alarming and threatening to people. In another study by the authors (2012) they showed that affirming people's self-worth beforehand decreased their avoidance of risk feedback, even if the feedback might obligate them to engage in undesirable behaviour or addresses an untreatable disease. The authors point out that there is still not much information science research outside a medical or health context.

Climate Change Communication: Effects of Message Framing

It has been highlighted, that in order to make people change their behaviours, information should be tailored to the audience receiving it (Gaspar, Domingos, Diniz & Falanga, 2016). That is where message framing comes into play, where information is shown in a way the aim to elicit a specific response from the receiver. This is usually achieved though emphasising a particular idea through placement, repetition as well as the use of cultural familiarity (Stea & Pickering, 2016).

There is a large body of literature specifically investigating message framing effects. One such area of interest is climate change. In this regard, a review by Corner et al.

(2015) highlighted four key determinants necessary for climate change communication, namely: the role of values and worldviews, the efficacy of information-based interventions, the psychological distance of climate change and its framing and the role of trusted messengers in its portrayal. The authors highlight the need to engage a younger audience with the topic, since they will crucially shape how generations to come will view the climate crisis.

In addition to these factors, contextual factors have also been shown to be relevant. An example is a study by Morton and colleagues (2011) which highlights the importance of uncertainty in communication. They found that when frames highlighted losses, uncertainty decreased intended action, while it increased those actions when highlighting losses not occurring.

Another study, in a political context, found significant changes in favor of pro-environmental attitudes and actions in conservatives when they were presented with messages that compared the environment today with nostalgic ones of the past (Baldwin & Lammers, 2016). The authors claim that their findings support the notion that ideological differences can appear from simple psychological processes but can be overcome with framing methods specifically targeted at these processes.

With regards specifically to the effect of message frames, a study by Lu, McComas and Besley (2017) was able to show that message frames could cause psychological reactance when people felt like their freedom was limited, which they demonstrated by attempting to regain that freedom by engaging in behaviour that helps discourage that freedom. The authors argued that the climate change frame would be overwhelming to process thus triggering existential risk to a greater extent than the other frames.

In this regard, it has been previously argued that negative messages about climate change fail to increase concern and support for action because peoples' base need for a stable world order is threatened (Feinberg & Willer, 2011). Overall, there seems to be the trend that people tend to identify more with health risk frames than topics related to the environment. Health literature shows that people can identify better with a health frame as that topic is directly relevant to their personal lives, and climate change is subsequently ranked as a lower in priority for personal engagement (Petrovic, Mardigano & Zaval, 2014).

In communication science, some explanations have been put forward with regard to

climate change message framing effects. One example is the existent research on active information avoidance with regards to climate change, which shows that active information avoidance can occur in order to avoid unpleasant news that do not align with a person's world view (Markowitz & Guckian, 2018). Generally, there is a distinction between passive and active avoidance. Passive avoidance relates to avoiding information that is processed cognitively and relates to pre-existing, deeply held beliefs, often about us and subjects closely connected to our identity. Active avoidance on the other hand refers to short-term coping mechanisms in response to specific information that is processed affectively (Narayan et al., 2011).

Health Communication concerning red meat consumption: Effects of Message Framing

Another field of research that has studied message framing effects is health communication research, particularly the studies concerning red meat consumption. Meat consumption represents a health issue, because red meat consumption is classified as probably carcinogenic by the World Health Organisation (World Health Organization, 2015) and there is rising evidence about its adverse health effects when overly included in human diet. One example is a study that investigated message frames aiming to reduce red meat consumption, by testing whether the persuasiveness of pre-factual or factual messages in health or wellbeing contexts differed depending on the people's self-efficacy levels in their eating habits (Bertolotti, Carfora & Catellani, 2020). They found that pre-factual wellbeing messages and factual health messages reduced people's intention to eat red meat through triggering their involvement. Further, eating self-efficacy efficiently moderated these effects, with the factual health messages persuading high-level self-efficacy individuals while pre-factual wellbeing messages had an effect on people with more average levels.

A Dutch study (De Boer, Schösler & Boersema 2013) investigated participants' responses to choosing one or more meat-free meals when highlighting that this behaviour could really contribute to mitigating negative impacts on the environment and of climate change. The meat-free meal was received more positively by environmentally- conscious consumers than by those who did not value care for nature. It was received more

negatively by climate change sceptics but not more positively by those taking the issue seriously, suggesting that this message frame could be more counterproductive. The authors suggest combining health and nature values with the meat-climate issue rather than isolating it in order to boost motivation for behaviour change in that area.

Moreover, Vainio and colleagues (2018) investigated the effect of messages to reduce red meat consumption in favour of plant-based alternatives in both heath and climate contexts. They found no effect of message frames but confirmed that prior beliefs about meat had a strong influence over an effect of information. However, a study by Carfora et al (2019) that aimed to decrease red meat consumption through message frames found that both health and environmental messages were effective. The authors tested the effectiveness of daily messages in frames of health, environment or health + environment benefits of reduced intake of red processed meat in Italian undergraduate students, having a no message control group as well. They also concluded that attitude could mediate the effects of health and environmental condition on reducing meat consumption.

Study goals

Intention to reduce meat consumption and information avoidance: Effects of health and climate change frames

The reviewed research has shown examples where message framing effects can be found, both in the health communication domain concerning red meat consumption and in the climate change communication domain. However, the literature is scarce regarding the combination of the two literatures. Accordingly, while research has analyzed the effect of messages red meat consumption framed as health-related risks, the literature is not yet well-established with regard to what occurs if red meat consumption is framed in the context of climate change. Particularly, it is unclear which could be the effect of such framing with regard to intention to reduce meat consumption and additionally, with regard to climate change or health related information avoidance. Given this, we aimed to answer the following research question:

Q1: *A message that frames meat consumption as a climate change issue (vs. as a health issue) has an effect over information avoidance and the intention to reduce meat intake?*

In order to answer this question, two hypotheses were put forward:

H_1: More information avoidance will occur when participants are exposed to red meat consumption information in CC frame compared to a health or control frame.

H_2: Lower intention to reduce red meat will occur when participants are exposed to meat reduction messages framed in relation to CC, than when exposed to messages with a health or control frame.

Overall, it is proposed that framing red meat consumption in a climate change frame will make people more prone to information avoidance, because the messages may cause psychological reactance (Lu, McComas & Besley, 2017), given that the context makes salient an existential risk (higher risk perception) which does not occur for the control or health group. Likewise, intentions to reduce red meat consumption will be lower in the climate change frame, due to the defensive mechanism this context may trigger compared to health or regular frames (Carfora et al., 2019).

Message framing and intention to reduce meat consumption and information avoidance: Moderator effects of Interpersonal resources

In addition to showing ironic message framing effects from presenting information, it is also important to understand how such effects can be attenuated. Thus, a second research question was put forward:

Q2: *Are there are ways that a negative effect of climate change message framing can be attenuated and avoid subsequent information avoidance?*

Research in health communication one such variable that can have an attenuating effect, namely it has shown that people lacking personal and interpersonal resources, also referred

to as social support, are more likely to avoid learning potentially threatening information (Howell & Sheppard, 2014).

Social support refers to the various networks that people have to help them cope with many aspects of their personal lives. These support resources often aid with emotional and intangible matters, such as personal advice, companionship and a sense of belonging. It can be measured in terms of people's perception to what extent that help is perceived as available to them when they need. Sources of support can include for example close family, neighbours, colleagues or even pets. Having a reliable social network can positively impact a person's life, especially in times of distress.

Unsurprisingly, studies revealed that people with access to a high support network were less prone to anxiety and depression than those without or with low support (Barrera, 1986). Low support was associated with higher rates of mental disorders such as developing an eating disorder, among many others (Stice, Presnell & Spangler, 2002). One study concerned with eating disorders found that many people who suffer from them, perceived social support benefit as rather low and were put off by barriers such as fearing social stigma or a lack of financial resources preventing them to seek help from others (Akey, Rintamaki & Kane, 2013). An example by Connor and colleagues (2016) highlights that interpersonal networks of individuals should be investigated more in the context of climate change communication, since they form an essential component of behaviour change. The study focused on digital social networks and found that statement about conventional topics within climate change, such as its impact on the environment and health, were retained better in communication changed compared to less common topics such as the impact on social competence. This suggested that personal and interpersonal resources can be robust predictors of information avoidance and particularly that low perceived interpersonal resources imply higher information avoidance (Howell, Crosier & Sheppard, 2014).

The literature exploring interpersonal resources' impact on information avoidance is still rather scarce. To the extent of our knowledge, there has not been a study exploring that relationship in a red meat consumption context and climate change communication. Interpersonal resources refer to people's social support networks. It is considered to be a powerful threat-management resource, and there is evidence that people with a strong support network can handle stressful situations better and overall display less

defensiveness (Howell & Sheppard, 2014). This can help such individuals cope better with other health and psychological related problems compared to people who have less access to such resources. For example, crisis decision theory as proposed by Sweeny (2008), suggested that people with ample interpersonal resources should be more willing to seek information and are subsequently less prone to information avoidance, studied in health context (Sweeny, 2010).

Following from such ideas, Howell and Sheppard conducted the first series of studies exploring interpersonal relations' direct effect on information avoidance. Hence, drawing from second research question, a more specific one can be detailed:

Q2.1: Do interpersonal resources moderate the effect of a climate change frame on information avoidance?

Investigating if this effect found for health frames also occurs in climate change communication, namely, if perceived availability of personal and interpersonal resources to cope with the perceived threat of climate change is a predictor of information avoidance, could provide innovative insights for this research area. Subsequently, this study will further hypothesise:

> *H3: Interpersonal resources function as a positive moderator, attenuating the relationship between a CC frame and information avoidance.*
>
> *H4: Interpersonal resources function as a positive moderator, attenuating the relationship between a CC frame and the intention to reduce red meat consumption.*

Additionally, a methodological goal of the study was to adapt the Information Avoidance Scale (Howell & Shepperd, 2016) to fit a Climate Change and Meat Intake investigation. To our knowledge, the information avoidance scale has not yet been applied in the specific context of the current study, and validation of such a scale would be a novel addition to the existing research field.

Climate change and meat consumption in Portugal

While a lot of data on climate change communication is collected from the US, the current study wants to investigate a Portuguese sample to contribute to the existing literature. Portugal already faces environmental challenges in association with climate change, such as water shortages and wildfires in some regions. It has been predicted that the annually available burnable area will dramatically increase over the years, especially in northern and central regions but overall around 279% for the whole of Portugal (Carvalho et al., 2009). Further, important economical and sociocultural areas such as viticulture are likely to be affected by climate change, since a warming and drying of future growing seasons is predicted (Jones & Alves, 2012). The long-term effects of that remain unclear, but it is possible that climate fluctuation and unbalanced grape ripening negatively affects the wine quality in the future, and actions should be taken to best prepare for these hanging conditions (Fraga et al., 2015). Given these vulnerabilities of recorded climate-related events such as wildfires, droughts, heat waves, coastal flooding etc. that can disturb the countries' economy and sociocultural values, Portugal should be an interesting case to develop better climate change communication (IPCC, 2014).

A Portuguese review investigating public engagement with climate change compared to other EU member states found that high levels of concern contrasted with limited understanding and weak behavioural attitudes to actually address climate change. It was found that Portuguese citizens rely heavily on media information to gain knowledge about the climate crisis, which focuses mainly on a technological discourse and discusses the crisis on a global level (Carvalho, Schmidt, Santos & Delicado, 2014).

Overall, the literature discussed presents an image that climate change communication in Portugal is primarily seen as a global problem without addressing national responsibility (Horta & Carvalho, 2017), making it likely that people do not identify with the issue and thus are less willing to change to more pro-environmental behaviours.

In the context of the present study, it is important to examine Portuguese food culture, since it presents one of the most crucial areas of anthropogenic climate change that is globally neglected. Portuguese cuisine traditionally includes a lot of meat recipes, with beef making up a lot of staple dishes. Unsurprisingly, one study revealed that Portuguese centenarians consume less processed and red meats than the average Portuguese person, in

line with the health literature suggesting that our meat-related food habits could be linked to our overall health and affect longevity (Da Silva et al., 2017).

However, with regards to eating behaviours, recent data collected by the University of Lisbon found that 50.6% of Portuguese nationals surveyed were willing to reduce to reduce meat consumption and 46.6% would pay higher prices for more sustainable meat products (Great Sustainability Survey Portugal, 2019). This data is hopeful in terms of an extent of willingness to change behaviour within the Portuguese community, but overall research linking eating behaviours and climate change in Portuguese context appears scarce. Given that the Portuguese consumer awareness of the environmental impacts of meat is not very developed it is important to explore this area more, since acknowledging those impacts has been found to be positively associated with less meat consumption and a willingness to reduce current meat eating habits (Graça, Oliveira & Calheiros, 2015). Conclusively, climate change communication in Portugal has been focused in relation with wildfires in the recent years, but the current study aims to bridge the climate crisis with the Portuguese meat-eating behaviour, which has also been increasingly studied but less in relation as a direct factor contributing to anthropogenic climate change.

Method

Design

The study employed an experimental design based on one between-subjects factor (message frame: control; climate change; health) to test whether the independent variable of message frame had an effect on information avoidance and intention to reduce meat consumption. In addition to testing between subjects' differences through a MANOVA analysis with one factor, the study also intended to further explore whether interpersonal resources, in the form of one's social network, would serve as a moderator between the variables, based on a Moderation Analysis through Linear Regression.
The independent variable manipulation consisted of three different messages, in the form of a text referring to red meat production and consumption presented with either a control

information (no mention to climate change nor health), climate change information (climate change related risks emerging from meat production and intake) or health information (health related risks emerging from meat intake.

Sample

The study was conducted with 209 participants (133 Portuguese /76 English-speaking) who were invited to participate in an online survey named "Global changes and consumption" through the Qualtrics online platform. A non-random convenience sample was recruited through a snowball sampling technique based on the researchers' social network, as well as through various Facebook groups and Reddit groups. The required initially identified a desirable number of 60 participants across the three frame groups.

Criteria for sample inclusion included being 18 years or older and following a meat-inclusive diet, which was controlled for in the beginning of the survey to ensure that no vegetarians/vegans would participate as the questions related to meat consumption would not apply to them.

Table *1: Descriptive Statistic: International Sample*

Gender	*76 (40 female/36 male)*	
Age Range	*18-60*	
Duration	*M*	*SD*
	1057.68	*966.9*
Meat per week	*4.4*	*3.9*
Age	*27.6*	*9.6*

Table *2: Descriptive Statistics: Portuguese Sample*

Gender	*133 (61 female/72 male)*
Age Range	*18-79*

Duration	*M*	*SD*
	1654.04	*7201.1*
Meat per week	*4.5*	*2.7*
Age	*35.67*	*13.8*

Materials and Procedure

The participants received a link to the survey that was shared via Gmail or directly pasted into the social media groups, for participants to enter the survey. Upon entering the survey, participants were presented an informative introduction as well as informed consent form (Appendix I). Subsequently, they were asked to indicate whether their diet included meat, in order to ensure that only meat-eaters went on to proceed with the questionnaire, as this was an exclusion criterion. If "No" was selected, the questionnaire terminated at that stage, whereas "Yes" would ask them to indicate how many times a week meat was typically consumed. Participants were then asked to provide socio-demographic information such as age, gender, and nationality as well as whether they or a close family member had work related to the meat-industry (Gaspar et al 2016).

Attitudes towards climate change and meat intake

The first set of questions asked participants to indicate on a 7-item bipolar response scale how they felt when they thought about climate change and eating meat, respectively (e.g. How do you feel when you think about eating meat? When I think about eating meat, I feel...). Selecting "1" on one extreme of the continuum, would indicate negative attitudes with responses such as "Bad" or "Negative" whereas selecting "7" on the other extreme of the continuum would indicate positive attitudes with responses such as "Positive" and "Satisfied" (Appendix III). The scale was adapted from (Gaspar et al., 2016) and modified to investigate climate change and meat consumption.

Perceived risks

Participants were asked to indicate on a 7-item scale the level of perceived risks both for climate change related risks and meat consumption risks, "1" indicating "Very low" and "7" meaning they perceived them as a "Very high" risk. The questions explored whether risks perceived would differ between themselves, a family member and a stranger, e.g. *The risks associated with climate change are…. for me* or *The risks associated with eating meat are…. for a family member of mine* (Appendix IV). The scale was adapted from Gaspar and colleagues (2016) and modified to investigate climate change and meat consumption.

Exposure to Climate Change related events

Participants were asked the question *"Throughout your life, do you feel that the following meteorological phenomena have become more frequent, less frequent or have remained approximately the same in your country?"* The frequency ranged from 1 "Much less frequent" to 5 "Much more frequent", with meteorological events presented being floods, periods of prolonged drought, heat waves and severe storms (Appendix VI).

Message Frames

After being presented with the questions referred above, participants were presented with one of three possible information concerning meat production and consumption. They were informed that they would receive a text with general information about red meat consumption, as well as being told to pay close attention, as there would be some questions in the end to assure that the content was understood. Participants were randomly assigned to a control, climate change or health frame text (Appendix II). The frame manipulation was adapted from Lu, McComas and Bresley's (2017) climate change frames. All participants were presented with a text block regarding general factual information about red meat production and consumption, adapted from Gaspar and colleagues (2016). Both the Health and Climate Change Frame group where additionally

presented with more information relating to either health or environmental consequences resulting from the red meat industry, as well as he addition of a persuasive line at the end of the climate change and health frame as seen in the study by Carfora and colleagues (2019) in a prefactual formulation order to emphasise the potential consequences of meat consumption behaviour in the respective contexts (e.g. If you eat little red and processed meat, you will protect the environment from the release of harmful greenhouse gases for the climate change frame). The text was followed by the manipulation check question *"Which of the following is not considered a red meat?"* as well as one individualised question matching the content of the frame group.

Interpersonal resources

After the message framing manipulation, participants were asked about their perceived interpersonal resources, e.g. social support network available to them, to later see if that would moderate the influence of the message frame on information avoidance and intention to reduce meat consumption. The *Medical Outcomes Study* (*MOS*) *Social Support Survey* (Sherbourne & Stewart, 1991) was used both in its original form as well as translated into Portuguese, for the non-Portuguese and Portuguese sample respectively. It consists of 19 items that investigate individual differences in perceived social support by asking people to indicate ‘‘How often’’ a variety of ‘‘kinds of support are available to [them] if [they] need it.’’ (Appendix V). Participants chose from five response options: never, a little of the time, some of the time, most of the time, all of the time. Example items included, ‘‘someone you can count on to listen to you when you need to talk’’, ‘‘someone to take you to the doctor if you needed it,’’ and ‘‘someone to have a good time with. This method was adopted from Howell, Crosier & Shepperd (2014) who had previously investigated if the lack of interpersonal resources would affect information avoidance.

Information Avoidance

Participants responded to an 8-item scale by Lee, Howell & Shepperd (2016) which was adapted into a 16-item scale in order to assess information avoidance with regards to knowledge about both climate change and health. The scale was anchored with 1 =

Strongly Disagree and 7= Strongly Agree. Item examples include "*I would rather not know the carbon footprint of my diet*" and "*It is important to know whether my diet will put me at risk for cardiovascular disease*", which would be reverse coded (Appendix VII).

Intention to reduce meat consumption

Participants were requested to respond to three items with a Likert type scale, identifying to what extent (1 = Not at all, 5 = Very much) they felt inclined to reduce their meat intake, avoid eating meat and follow a plant-based diet. The scale was adapted from Graça, Calheiros and Oliveira (2016) and has previously been used in Portuguese and English.

Manipulation checks

At the end of the survey, participants were asked to write a short impression of what they thought the study was trying to investigate as a final manipulation check, in order to check whether they were aware of the study's specific goals and manipulations. Results showed that the participants were not aware of these.

Results

Main Analysis

Prior to the analysis, reliability checks were carried out using the SPSS Software and confirmed high correlations between items across scales, as can be seen in Table 1 below:

Table 3: Reliability Checks

Scale	Cronbach's Alpha	Number of Items
Social Support	.956	18
Risk Perception Meat	.884	3
Risk Perception Climate	.918	3
Attitude Climate	.955	4
Attitude Meat	.963	4
Climate Change Event Exposure	.791	4

A Principal Components Analysis was performed in order to explore the structure of the latent variable Climate Change Information Avoidance. The analysis showed a Kaiser-Meyer-Olkin (KMO) value of .80, representing a good value (Marôco, 2011). According to the rule of an eigenvalue greater than 1 and based on visual analysis of the Scree Plot, results showed that the latent variable contains two components which explain 60.84% of the total variance. Based on a varimax rotation, items 3, 5, 7 and 8 load on the first component, with values between .73 (min) and .85 (max) and items 1, 2, 4 and 6 load on the second component, with values between .69 (min) and .79 (max). A PCA was also performed for the latent variable Health Information Avoidance, which showed a Kaiser-Meyer-Olkin (KMO) value of .81, representing a good value (Marôco, 2011). Results showed that the latent variable contains two components which explain 62.49% of the total variance. Based on a varimax rotation, items 1, 2, 6 and 8 load on the first component, with values between .73 (min) and .85 (max) and items 3, 4, 5 and 7 load on the second component, with values between .69 (min) and .79 (max).

Overall, for both scales, two components/factors emerged consistently across scales, with items 3, 5 and 7 in both scales representing a component/factor and items 1, 2 and 6 representing another.

Concerning the reliability analysis, the same value of $\alpha = .79$ was identified for the variable Climate Change Information Avoidance and for the variable Health Information Avoidance, both representing an internal consistency with approximate values of good reliability (Marôco, 2011).

A MANOVA was performed through the General Linear Model Analysis function in SPSS in order to explore whether exposure to a climate change frame would lead participants to display higher climate change information avoidance regarding meat consumption compared to the other two conditions, Health and Control (H1). The Tukey HSD Post-Hoc test was applied as a correction to ensure the correction of uneven sample sizes between the three message frame groups (N Control= 58, N Health=77, N CC= 74). No significant main effect was found between the three message frame groups, meaning the message frame did not influence information avoidance among participants, $F(1,208) = 27.056$, $p < .005$, $d = .999$. As a result, the hypothesis was refuted.

The second hypothesis investigated whether messages framed in a climate change context would display a lower intention to reduce red meat consumption than when exposed to messages in a Health and Control frame (H2). No significant main effect was found between the three message frame groups, meaning a climate change message frame did not have an effect on participants' intention to reduce their meat consumption. As a result, the hypothesis was refuted.

Following, the study investigated whether interpersonal resources in form of social support, would function as a positive moderator, attenuating both the effect of a CC frame on information avoidance (H3) as well as on the intention to reduce red meat consumption (H4). This was explored using the PROCESS Procedure for SPSS Version 3. 4 by Andrew F. Hayes (2018). No significant effect was found for Interpersonal resources as a moderator in on both CC message frame effect and intention, suggesting that for the study's sample, social support did not attenuate the effect of a CC message frame on climate change information avoidance. This is a consequence of the framing effect itself not being supported in H1, as well as for intentions to reduce red meat consumption. Consequently, both hypotheses were refuted.

Exploratory Analysis

While the set of four hypotheses has not been supported by the study's findings, additional exploratory analysis presented relevant results. The social support measure can be considered a proxy to the variable subjective norm in the Theory of Planned Behaviour

(Ajzen, 1991), which according to the theory, predicts behavioural intention. In such theory, another predictor of intention is the attitude. Thus, we further explored it as a moderator of the relationship between frame and intention (and also avoidance) and as a direct predictor of intention. Using the PROCESS Procedure for SPSS Version 3. 4 by Andrew F. Hayes again, Attitude towards eating meat was not found to be a moderator but rather negative predictor (B = -.29) of intention to reduced meat consumption, F (1,208) =27.056, p<.005, d=.999, meaning that a decrease in attitude's positivity was associated with an increased probability of having high intent to reduce meat consumption, .

Further analysis explored the role of perceived risks related to both climate change and meat consumption, given that the health literature has demonstrated that risk perception can be of the strongest motivators of behaviour change (Petrovic, Madrigano & Zaval; 2014) and may function as a predictor of behavioural intentions. Risk perception of climate change was found to be a negative predictor (B = -.21) of climate change information avoidance, F (1,205) = 6.68, p<.005, d=.999, meaning that increases in risk perception about climate change are associated with increasing probability of climate change information avoidance. Differently, health risks perception of meat consumption, was not a significant predictor (B = -.17) of health information avoidance, F (2,207) =.334, p>.005, d=.005, suggesting that there is indeed something special about the climate change frame.

Additionally, Pearson correlation analyses were performed to explore relationships between all the study variables. Results showed a strong positive relationship (r=.84, p<.05) between health information avoidance and climate change information avoidance. Further, there was a negative weak relationship between climate change Risk perception and climate change Information avoidance (r=.29, p<.05), suggesting that the more aware participants were of climate change as a risk, the less likely they were to avoid learning more about it and vice-versa. Climate change Exposure had a weak positive relationship on both Climate change risk perception (r=.33, p<.05), as well as on Meat (r=.26, p=.001), suggesting that the more participants had been exposed to climate change the more perceptive they were to view both climate change and Meat consumption as a risk, with the effect being slightly stronger for climate change and vice-versa.

Health Information Avoidance had a negative weak relationship with both Intention (r=.33, p<.05) as well as Risk perception of climate change (r=.37, p<.05), suggesting that the

more information avoidance participance displayed about health information, the less likely they were to intend to reduce their meat consumption or see climate change as a perceived risk.

Given that the data collection procedure implied a collection of both a Portuguese and non-Portuguese sample, we further explored whether results would differ for Portuguese participants (N=133) compared to foreigners (N=76), information avoidance in a climate change context was assessed taking into account nationality. A Linear regression was performed and showed that nationality did significantly affect information avoidance in a climate change context, F (1,208) =7. 677, p=.006, d=.788. Consequently, while this extended analysis did not find a relationship between Attitude and Information avoidance in a climate change context for solely the Portuguese participants, F (1,207) =.915, p=.403, d=.014., or Health context, F (1,207) =.334, p=.403, d=.716, it did show a negative weak effect between Risk perception of Meat and Information Avoidance in a climate change context (r=.19, p<.05), but not in a Health context. Further, this sample found that Risk perception of meat served now as a predictor of Information Avoidance in a health context. These findings suggest that for the Portuguese sample, participants were not defending their views about risk perception by avoiding processing more information about climate change.

Discussion

The first main goal of the current study was to explore the effect of a climate change frame, compared to a Health and Control frame, on information avoidance (H1) and intention (H2) when exposing participants to messages about red meat consumption. Further, the study wanted to investigate whether interpersonal resources, in form of social support, would function as a positive moderator and attenuate the effect of a climate change frame on information avoidance (H*3*) and intention (H*4*) with regards to reducing red meat consumption. The second main goal was to create an adapted version of the information avoidance scale for two contexts not considered in its original form: climate change and health.

To fulfil these goals, the study took form as an online survey measuring participants' attitudes towards climate change and red meat consumption, their climate change events' exposure and risk perception. Participants were asked to read an informative text about red meat, which was either presented with a control, health or climate change message frame. Subsequently, they filled out questionnaires to assess available social support, information avoidance in both environmental and health contexts and were asked to indicate their intentions to reduce meat consumption in the future.

Climate change information avoidance and health information avoidance: Preliminary validation of scales

The preliminary validation of adapted version of the information avoidance scale for climate change information avoidance and for health information avoidance, presented good levels of reliability and internal validity. For both scales, two components/factors emerged, with most items that saturated in each component, being consistent across the two scales. Therefore, the methodological goal of developing and validating these two scales was successful. Moreover, given the two overall consistent components that emerged in each scale, future studies could further understand the factorial structure of the scale and assess what the two factors represent.

Further, the two measures were highly positively correlated concerning avoidance in health and climate contexts, meaning participants tended to score similarly high or low across both. On one hand, this result can indicate that people may have a general avoidance orientation or tendency to avoid, as part of a psychological defence mechanism when they are exposed to risk information that may somewhat induce cognitive dissonance by conflicting with their prior beliefs and worldviews (Gaspar et al, 2016). On the other hand, it may also suggest spill-over effects between the two types of risk information avoidance, i.e. if I avoid one, I will avoid the other. Spillover usually refers to the adoption of a certain behaviour that leads to the adoption of another, usually related behaviour. It has been suggested that the study of behavioural spillover are a promising research area in both health and environmental contexts as they could help drive cost-effective behaviour change from a policy or practitioner perspective (Galizzi and Navarro-Martinez, 2019). In this regard, it may also be worth studying potential spillover effects from one form of

information avoidance to another and assess which aspects of such avoidance represent general avoidance orientations/tendencies and which may be subject-specific.

Information avoidance and intention to reduce meat consumption: message framing effects and the role of social support

The first set of hypotheses did not find a significant main effect between the three message frame groups, meaning the message frame did not influence participants' neither climate change nor health information avoidance or the intention to reduce their meat consumption. One potential methodological explanation for the results could be that the current study did not conduct a pre-test to show whether the message frames were understood or if the information was memorized in a way that would influence subsequent measures. The study by Lu and colleagues (2017) which influenced the design of the current work did not conduct a pre-test either, however the authors did include a message processing fluency measure, where participants indicated how comprehensible they found the questions they were asked to answer. Such measures could be introduced if the study was to be repeated in the future.

Similarly, the analysis revealed no significant effect for interpersonal resources as a moderator for both the climate change frame and intention, which suggests that social support did not attenuate the effect of a climate change message frame on climate change information avoidance. Since the refutation of the first two hypotheses indicated no significant relationship between the frames and the dependent variables, there would subsequently be no relationship to moderate. While there may be a more theoretical explanation as to why social support also did not show to be a predictor of the dependent variables, more research is needed in that regard, as the relationship between social support and information avoidance is not yet well understood (Howell, Crosier & Shepperd, 2014). One can speculate that there may be a potential lack of cognitive association between climate change and meat among participants of this sample. Studies previously mentioned did point out that media coverage does not yet adequately relate the meat industry to climate change (Friedlander et al., 2014) and that eating less meat is not necessarily yet recognised as a climate-friendly meal option (De Boer, Witt & Aiking, 2016). Future studies could try and test a mediating effect of the cognitive association between climate

change and meat, for example induced through contextual priming, in case this association is too recent for most people to recognise it.

While all four hypotheses of this study were refuted, additional exploratory analysis did present relevant results worth mentioning in light of previous scientific literature.

Information avoidance and intention to reduce meat consumption: relationships with attitudes and risk perception

Ajzen's (1991) Theory of Planned Behaviour is primarily focused on the prediction of intentions, which can be explained by taking normative, behavioural, perceptive and subjective norms into consideration. As such, attitude can serve as a normative predictor according to the theory. Thus, it was further explored as a moderator of the relationship between frame and intention (and also avoidance) and as a direct predictor of intention. Exploratory analysis revealed that attitudes towards eating meat was not found to be a moderator but instead a negative predictor of intention to reduce red meat consumption. In other words, the less positive participants were about eating red meat the more likely they were to score highly on intent to reduce meat consumption.

Moreover, perceived risk of climate change was found to be a negative predictor of climate change information avoidance. Hence, increases in risk perception about climate change were associated with a lower likelihood of avoiding climate change information. The same effect was not found for health risks perception of meat consumption. This would suggest that there is a difference in people's risk perception when information is presented in a climate context, which is line with previous literature (Lu, McComas and Besley 2017) This is a result worth of further exploration in future studies, given that it may indicate that risk awareness may be a necessary condition to reduce risk information avoidance. Indeed, past studies as for example Gaspar and colleagues' (2016) showed that people who were identified as red meat risk information avoiders, when they were exposed to risk information, their attitudes towards red meat consumption became less positive and they perceived their knowledge to have increased. Thus, exposure to risk information had a positive for risk information avoiders and thus, we infer from this that exposure to information that may increase risk awareness, may also have a role in reducing risk information avoidance, as it is seemingly indicated by the current study's results.

Nevertheless, this is a possible explanation that lacks data to fully support it and thus, future studies could address this.

Similarly, results showed that the more participants had been exposed to climate change, the more they were to perceive both climate change and meat consumption as a risk, with the effect being slightly stronger for climate change and vice-versa. Accordingly, a Norwegian study likewise highlighted the importance of personal experience of climate-related events on people's perception of climate change overall, as well as pointing out that living in a more exposed area but without having a personal experience of climate-related damage did not affect people's concern towards climate change. (Lujala, Lein & Rød; 2015). Hence, the current findings seem to highlight the importance of raising awareness about climate change in risk communication.

The current findings also suggested that the more information avoidance participants displayed about health information, the lower was their intention to reduce their meat consumption or perceive climate change as a risk, being in line with previous research that health information may trigger people more personally than an environmental frame (Petrovic, Madrigano & Zaval, 2014).

When taking into account the Portuguese sample only, differences between message frame groups were found in information avoidance but not intention. This time, no relationship was found between attitudes and information avoidance, but increased perceived risk of meat consumption would lead to lower information avoidance in a climate change context and vice versa. While this does not support the view that message framing in a climate change context triggers more information avoidance, it suggests that the Portuguese sample of the current study acted the way that would be desirable, as in not displaying a defensive mechanism when presented with threatening information. This may mean, that people should be more exposed to climate change information as being aware of risks will help combat information avoidance, in line with the Norwegian study mentioned before (Lujala, Lein & Rød; 2015).

Overall, it is worth noting that, while participants' age ranged from 18 to 79 years old, the mean age was close to 32 years and therefore quite young. Research shows that younger generations across the globe are more concerned about the climate crisis as well as more aware of their meat consumption. With regards to Portugal, this year marked the first time that a climate change case had been filed at the European court of human rights. The

case was filed by young individuals, four of them children, suggesting that these issues are of growing importance in the future (Watts, 2020).

Though the current study comprised a small sample, there is a need to expand the psychological literature beyond North American participants (Arnett; 2016). Given that climate change is high on the Portuguese political and social agenda, the findings contribute to an area of research that will hopefully find more attention in the future (Carvalho, Schmidt, Santos & Delicado; 2014).

Limitations

The current study faced some limitations, which should be considered in case a similar project is to be implemented in the future. Notably, the duration of the online survey exceeded what would be recommended for keeping participants engaged. The average response time took 23.95 minutes, which indicates that the majority of participants was not rushing through the survey, but they took beyond the recommended time for completion. However, former research has highlighted fatigue-effects, which can confound the results if participants are not engaged with the task (Lavrakas, 2015). Especially with regards to the Portuguese-language sample, the study was left incomplete by a very large amount of people, rendering a lot of collected data useless for the final analysis. While this could be due to different aspects of the study design, the time that has to be invested into completion without any incentives is likely the main reason for that result. In larger scale surveys, participants are often offered vouchers or some other form of incentive in return for their time, or in the case of students' course credits, though that form of incentive which is probably one of the most common in psychology data collection is often criticized for confounding ecological validity (Rad, Martingano & Ginges; 2018). On the bright side, one could infer that the people who did complete the survey until the end did though out of intrinsic motivation rather than being coerced into it for credits or some economical motivation, though that is open to speculation and a larger sample size would be advantageous in the future.

It has been suggested that participants tend to get more fatigued when they are presented with many matrix tables. Therefore, it is sometimes suggested to keep Likert

scales simple and short, even though designing a 7-scale Likert scale is widely accepted as the more accurate option (Simms, Zelazny, Williams & Bernstein; 2019).
Possible ways to make the task more engaging would be to add more visual cues to the design of the survey. Even in the context of communication science, the way the information is laid out as well as the colour scheme could affect the way information is processed apart from the way the content is framed and phrased (IPCC; 2018).

Additionally, the way the study was distributed, and the consequent cohort should be improved. Due to the budget limitation of the current study, it solely relied on a distribution via snowball method, meaning that it was shared through the social network of the responsible researchers. As previously described in the method section, the study was shared on social media platforms to attract a random selection of participants who fit the requirements. However, since it was also shared with the direct social network of the researchers, it cannot be denied that a certain section of the cohort would fall under the WEIRD sample (White, Educated, Industrial, Rich, Democratic) that makes up the majority of psychological research samples, but not the majority of people living in our world (Henrich, Heine & Norenzayan, 2010). It would be of great advantage to scale the study to a recruit a larger sample size, which could be easily achieved if a similar project would have access to professional online recruitment tools.

Future studies

Naturally, there a number of individual differences that the current study could have taken into account. One future consideration could be to add an assessment of people's resilience to stress. There are well-established scales in the field, e.g. the Resilience Scale for Adults that could provide useful insights, since stress-resilience could influence participants' perception about their social support, as one of its important purposes is to alleviate stress (Friborg et al., 2003). In this regard, climate change related events can also be considered stressors (Swim et al, 2011) which increases the potential interest to use such resilience scales.

Additionally, Prospect Theory famously states that people tend to avoid risk when presented a positive frame and seek risks when presented a negative frame (Tversky & Kahneman,1981). The implication of gain vs loss frames could be explored further in the

future. Further, the message frames in the current study were phrased in a way that was loss-framed, in line with the design of a previous study (Carfora et al., 2019). Research has shown that gain-framed messages appear to be more effective when promoting prevention behaviours in a health context (Gallagher & Updegraff, 2012). One study by Connor and colleagues (2016) found that gain frames are not successful for raising awareness about climate changes, finding that loss-frames were retained better later in communication chains. Hence, research should explore further in which contexts loss-framed messages are the most effective.

Further, personalization can reduce the psychological distance between the person and climate change which makes it easier for the person to engage with the issue (Anderson, 2017). Whether or not a person responds better to loss or gain-framed messages can differ between people. It could be helpful to assess people's regulatory fit in a climate change frame context, which has previously been explored in health frame settings (Ludolph, & Schulz, 2015).

Along with that, it would be advantageous to have more specific country comparisons to improve the personalisation of messages to explore cultural differences further and gain more knowledge about the Portuguese population against a specific foreign one in order to draw more precise comparisons.

While the present study measured intentions, it would be more insightful to design a study measuring actual behaviour change over time, as talking about intentions does not necessarily translate into measurable behaviour change (Vainio et al., 2018) and self-report measures are prone to social desirability effects (Krumpal, 2013).

Lastly, while the study chose red meat consumption as the focus in the message frames, there are many other pro-environmental behaviours that could be discussed in future research, such as fossil fuel emissions (Petrovic, Madrigano & Zaval, 2014). Likewise, environmental concerns could go beyond climate change and global warming. While red meat production is especially damaging due to its methane release, other meats such as chicken are said to cause more pollution in waterways and are hence environmentally problematic as well. Depending on the population sample and country focus, the messages can be adapted. The present study aimed to help shed light on issues that are of global concern and likely relevant across countries.

Conclusion

The current study explored the effect of a climate change frame, compared to a Health and Control frame, on information avoidance and intention when exposing participants to messages about red meat consumption, and investigated whether interpersonal resources, in form of social support, would function as a positive moderator and attenuate the effect of a climate change frame on information avoidance and intention with regards to reducing red meat consumption. While no significant effects were found in the main analysis, the second main goal to create an adapted version of the information avoidance scale for two novel contexts, climate change and health, succeeded, while additionally adding an understudied sample population to the existing pool of literature. The present findings seem to highlight the importance of raising awareness about climate change in risk communication and suggest that people should be more exposed to climate change information as being aware of risks will help combat information avoidance. Those are promising results for the initial testing of novel hypotheses, encouraging future research replicating and improving the design further.

Appendices

Appendix I

Consent Form

The present study is part of a master's research project taking place at the Católica Research Center for Psychological, Family and Social Wellbeing (CRC-W). This study focuses on food consumption, health and global changes and aims to understand the importance of the information that exists in this regard. The study is carried out by Sophie Azita Kloever (kloeversophie@gmail.com) and coordinated by Prof. Rui Gaspar (rgaspar@ucp.pt), who you can contact if you want to ask a question or share any comments. Your participation, which will be highly valued, consists of answering a questionnaire and can last about 10 minutes. There are no significant expected risks associated with participating in the study. Although you may not directly benefit from

participating in the study, your answers will contribute to scientific advancement and improve the information that is given to the population on the topics under study. Participation in this study is strictly voluntary: you can choose to participate or not participate. If you choose to participate, you can stop participating at any time without giving any reason. In addition to being voluntary, participation is also anonymous and confidential. The data are intended for statistical treatment only and no response will be analyzed or reported individually. At no point in the study do you need to identify yourself. In view of this information, if you agree to participate, please click on "I accept" and then click on the button in the lower right corner of the page to proceed to the next page. Completing the questionnaire assumes that you understand and accept the conditions of the present study, consenting to participate.

Appendix II

Frame Messages

Control

Meat can be broken down in red meat, white meat and processed meat. Red meat includes beef, veal, lamb, and pork (fresh, minced and frozen), while white meat includes chicken, turkey, and duck. Processed meat includes ham, bacon, sausages, hamburgers, salami, corned beef and tinned meat. However, in this study we are only thinking about red meat. Red meat is an important part of the diet of many people in different countries across the world. Most red meat is eaten in the developed Western world although the rate of red meat consumption has been declining in Europe over the last twenty years. How much red meat is eaten varies between countries and also between men and women - overall men tend to eat much more red meat than women, 108g versus 72g per day. Accurately quantifying the amount of meat consumed in the diet is problematic, owing to the fact that meat is typically consumed as part of a meal, often containing other foods such as vegetables, or pasta, legumes or potatoes.
Some people avoid eating all red meat or some types of red meat. This may be for ethical or religious reasons - or for reasons of health or of cost.

Red meat is a basic source of protein, iron and other micronutrients in many people's diets. It can be consumed in processed form to improve flavour and preservation, such as cured, fermented or smoked meat. Examples of processed red meats include salami, bacon and many types of sausage. In the USA, for example, it is estimated that 60% of the meat consumed is red meat, with a quarter of the total meat consumption being processed meats, such as bacon and sausages.

Some people avoid eating all or at least some types of red meat. This may be due to ethical or religious issues or health or cost reasons. At the same time, the demand for red meat consumption is increasing with the increase in the population of the planet bone, putting more and more pressure on ecosystems and the global environment.

Health

While red meat is generally safe and is widely consumed by the public, its consumption has been linked to certain risks of chronic disease. Chief among these are cardiovascular diseases and colorectal cancer (also known as bowel cancer). Cardiovascular diseases have been linked to the high saturated fat content in red meat and thus to the build-up of cholesterol in the body.

It has been suggested that the link between red meat and colorectal cancer may be due to the compound that gives red meat its colour – haem – which may damage the lining of the bowel. Other studies have suggested that certain carcinogenic compounds are released when meat is cooked at high temperatures and that red meat cooked at 250^0C can be up to eight times more mutagenic than the same meat cooked at 100^0C.

At the same time, a diet high in meat, alcohol and low in fruit and vegetables has been associated with a 22% increase in the risk of colon cancer compared to a diet low in meat and high in fruit and vegetables. However, the scientific evidence is not always clear-cut: a study conducted in 2002 found that in the UK the incidence of colon cancer has increased despite a decline in meat consumption.

The evidence on the links between red meat consumption and various diseases is not always conclusive and sometimes the findings may seem to point in different directions. Nevertheless, the general nutritional advice is that consumers should eat no more than 70g

of red meat per day, avoid processed meat (or keep it to no more than two portions a week), and choose lean meat whenever possible. A balanced diet and careful preparation of red meat should enable consumers to benefit from its nutritional value while at the same time minimize its risks to health.

It should be noted however, that if you eat an excessive amount of red/processed meat, you could feel regret for not protecting your health from cancer.

Climate Change

Red meat has been associated with a number of risks which do not relate directly to human health. As red meat production requires large amounts of land for grazing, it can impact the production of more environmentally friendly foods such as cereals and vegetables. Many have argued that in the long run red meat production can lead to soil erosion and food scarcity. The meat production process requires large amounts of water and at the same time it releases fertilising compounds. Both these things can have a negative impact on river and lake ecosystems. In addition, meat production accounts for about 5% of global CO_2 emissions, 40% of methane emissions and 40% of various nitrogen oxides.

Red meat production, and in particular beef, has also been linked to the deforestation of vast areas of land, such as the Amazon forests in Brazil. Greater demand for meat from fast-developing economies such as China and India has increased the carbon footprint of red meat production. It has been calculated that producing 1kg of beef results in more CO_2 emissions than going for a three-hour drive while leaving all the lights on at home. Because of this, some scientists and environmental activists have been arguing for a reduction of red meat consumption, and indeed many consumers are nowadays opting for organic red meat as the environmentally friendly alternative. For example, a Swedish study conducted in 2003 claimed that raising organic beef on grass rather than feed reduced greenhouse gas emissions by 40% and consumed 85% less energy. Other consumers are opting for quorn or soya-based alternatives to meat, which have an even lower environmental impact. Ultimately, for many Western consumers, eating red meat is a lifestyle choice.

It should be noted however, that if you eat an excessive amount of red/processed meat, you could feel regret for not protecting the environment from the release of harmful greenhouse gases.

Appendix III

Attitudes towards meat

Como se sente quando pensa em comer carne? Quando penso em comer carne, sinto-me...

	1	**2**	**3**	**4**	**5**	**6**	**7**	
1.Mal	○	○	○	○	○	○	○	Bem
2.Insatisfeito	○	○	○	○	○	○	○	Satisfeito
3.Desagradável	○	○	○	○	○	○	○	Agradável
4.Negativo	○	○	○	○	○	○	○	Positivo

Appendix VI

Perceived risks

Classifique as seguintes afirmações com base nas informações que leu nas páginas acima:

	Extremamente baixos						*Extremamente elevados*
	1	**2**	**3**	**4**	**5**	**6**	**7**
Os riscos associados à carne para mim, pessoalmente, são...							
Os riscos associados à carne, para um membro da minha família, são...							
Os riscos associados à carne, para							

uma pessoa
do mesmo
sexo e idade
que eu são...

Appendix V

MOS Social Support Survey

Next are some questions about the support that is available to you.

1. About how many close friends and close relatives do you have (people you feel at ease with and can talk to about what is on your mind)?

Write in number of close friends and close relatives:

People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to you if you need it?

(Circle One Number On Each Line)

	None of the Time	A little of the Time		Some of the Time	Most of the Time	All of the Time
2. Someone to help you	1	2	3	4	5	
If you were confided	1	2	3	4	5	
To bed?						
3. Someone you can count	1	2	3	4	5	
On to listen to you when you						
Need to talk						
4. Someone to give you	1	2	3	4	5	
Good advice about a crisis						
5. Someone to take you to	1	2	3	4	5	
The doctor if you need it						
6. Someone who shows you	1	2	3	4	5	
Love and affection						

7. Someone to have a good Time with	1	2	3	4	5
8. Someone to give you Information to help you Understand a situation	1	2	3	4	5
9.Someone to confide in or Talk to about yourself or Your problems	1	2	3	4	5
10. Someone who Hugs you	1	2	3	4	5
11. Someone to get Together for relaxation	1	2	3	4	5
12. Someone to prepare your Meals if you were unable to Do it yourself	1	2	3	4	5
13. Someone whose advice You really want	1	2	3	4	5
14. Someone to things with to Help you get your mind Off things	1	2	3	4	5
15. Someone to help with daily Chores if you were sick	1	2	3	4	5
16. Someone to share your most Private worries and fears with	1	2	3	4	5
17. Someone to turn to for Suggestions about how to Deal with a personal problem	1	2	3	4	5

18. Someone to do Something enjoyable with	1	2	3	4	5
19. Someone who understands your problem	1	2	3	4	5
20. Someone to love and Make you feel wanted	1	2	3	4	5

Appendix VI

Climate Change Event Exposure

Throughout your life, do you feel that the following meteorological phenomena have become more frequent, less frequent or have remained approximately the same in your country?

	Much less frequent	A bit less frequent	More or less the same	A bit more frequent	Much more frequent
Severe storms	○	○	○	○	○
Periods of prolonged drought (without rain)	○	○	○	○	○
Heat waves (periods with very high temperatures)	○	○	○	○	○
Floods	○	○	○	○	○

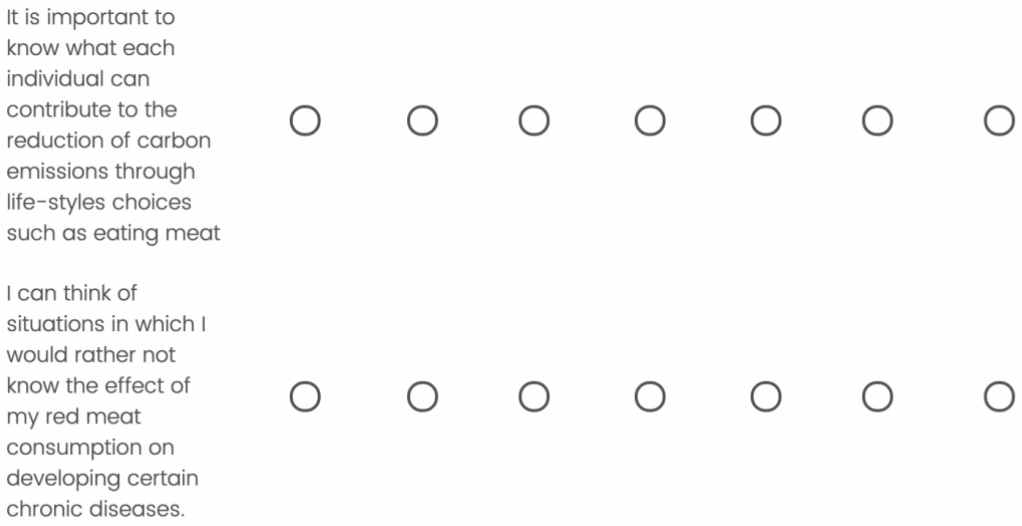
Please answer the following questions. Try not to think too much about your answers and choose your level of agreement with the following sentences.

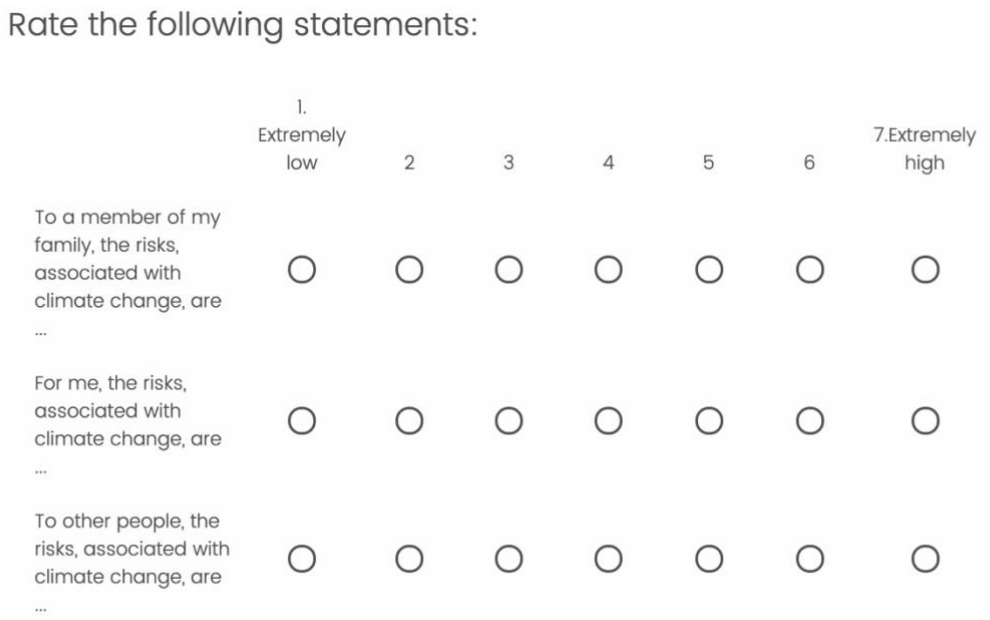
	1.Strongly Disagree	2.	3.	4. Neither disagree or agree	5.	6.	7.Strongly Agree
I would rather not know if the amount of meat I eat included in my current diet is healthy for me	○	○	○	○	○	○	○
I want to know if I can contribute to improving the national health system by reducing the amount of meat any health concerns I have are related to the way I eat meat	○	○	○	○	○	○	○

If I could, I would avoid learning if the amount of meat way I eat will do me harm in the long-run	○	○	○	○	○	○	○
When it comes to facing the fact that meat production is contributing immensely to greenhouse gas emissions [sometimes] ignorance is bliss	◉	○	○	○	○	○	○
I want to know if the amount of meat I consume is sustainable	○	○	○	○	○	○	○
Even if it will upset me I would want to know if the amount of meat I eat is putting me at increased risk for cardio-vascular disease	○	○	○	○	○	○	○
I want to know immediately if the amount of red meat I eat is within what the recommended guidelines	○	○	○	○	○	○	○
It is important to know if my consumption of red meat is putting me at risk for cardiovascular heart diseases.	○	○	○	○	○	○	○

4

	1.Strongly Disagree	2.	3.	4. Neither disagree or agree	5.	6.	7.Strongly Agree
I would avoid learning if meat production is more resource-intensive compared to other foods, especially plant-based ones.	○	○	○	○	○	○	○
I would rather not know how many forests are cut down in order to sustain meat production	○	○	○	○	○	○	○
I can think of situations in which I would rather not know the amount of emissions resulting from land usage required to sustain meat production	○	○	○	○	○	○	○
I want to know if I can individually impact Climate Change through reducing my meat intake	○	○	○	○	○	○	○
Even if it will upset me, I want to know the carbon footprint of my meat consumption	○	○	○	○	○	○	○
When it comes to facing the fact that one's meat consumption impacts on health, sometimes ignorance is bliss	○	○	○	○	○	○	○





Appendix VII

Measurement of Intention

Willingness toward meat substitution"
: - Por favor indique em que medida está disposto a: - Reduzir o seu consumo de carne, - Evitar consumir carne, - Seguir uma alimentação de base vegetal.

Appendix VIII

Main Analysis SPSS Output

Correlations

		Info_Avoid_CC	Info_Avoid_Health	Info_Avoidance
Social_Support	Pearson Correlation	-.081	-.075	-.086
	Sig. (2-tailed)	.354	.388	.326
	N	133	133	133
Intention	Pearson Correlation	-.420**	-.332**	-.371**
	Sig. (2-tailed)	.000	.000	.000
	N	133	133	133
Attitudes_Climate	Pearson Correlation	.082	.094	.104
	Sig. (2-tailed)	.346	.282	.235
	N	133	133	133
Attitudes_Meat	Pearson Correlation	.136	.111	.136
	Sig. (2-tailed)	.119	.204	.118
	N	133	133	133
Info_Avoid_CC	Pearson Correlation	1	.858**	.939**
	Sig. (2-tailed)		.000	.000
	N	133	133	133
Info_Avoid_Health	Pearson Correlation	.858**	1	.957**
	Sig. (2-tailed)	.000		.000
	N	133	133	133
Info_Avoidance	Pearson Correlation	.939**	.957**	1
	Sig. (2-tailed)	.000	.000	
	N	133	133	133
Risk_Climate	Pearson Correlation	-.210*	-.311**	-.273**
	Sig. (2-tailed)	.015	.000	.001
	N	133	133	133
Risk_Meat	Pearson Correlation	-.191*	-.165	-.148
	Sig. (2-tailed)	.028	.058	.090
	N	133	133	133
CC_Exposure	Pearson Correlation	-.050	-.093	-.088
	Sig. (2-tailed)	.565	.287	.314
	N	133	133	133

Correlations

		Risk_Climate	Risk_Meat	CC_Exposure

Social_Support	Pearson Correlation	.103	-.051	.168
	Sig. (2-tailed)	.238	.564	.054
	N	133	133	133
Intention	Pearson Correlation	.168	.306**	.119
	Sig. (2-tailed)	.053	.000	.171
	N	133	133	133
Attitudes_Climate	Pearson Correlation	-.110	-.057	-.215*
	Sig. (2-tailed)	.207	.513	.013
	N	133	133	133
Attitudes_Meat	Pearson Correlation	-.157	-.262**	-.080
	Sig. (2-tailed)	.071	.002	.357
	N	133	133	133
Info_Avoid_CC	Pearson Correlation	-.210*	-.191*	-.050
	Sig. (2-tailed)	.015	.028	.565
	N	133	133	133
Info_Avoid_Health	Pearson Correlation	-.311**	-.165	-.093
	Sig. (2-tailed)	.000	.058	.287
	N	133	133	133
Info_Avoidance	Pearson Correlation	-.273**	-.148	-.088
	Sig. (2-tailed)	.001	.090	.314
	N	133	133	133
Risk_Climate	Pearson Correlation	1	.383**	.428**
	Sig. (2-tailed)		.000	.000
	N	133	133	133
Risk_Meat	Pearson Correlation	.383**	1	.342**
	Sig. (2-tailed)	.000		.000
	N	133	133	133
CC_Exposure	Pearson Correlation	.428**	.342**	1
	Sig. (2-tailed)	.000	.000	
	N	133	133	133

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		Social_Support	Intention	Attitudes_Climate	Attitudes_Meat
Social_Support	Pearson Correlation	1	.053	-.083	.093
	Sig. (2-tailed)		.544	.342	.289
	N	133	133	133	133
Intention	Pearson Correlation	.053	1	-.126	-.298**
	Sig. (2-tailed)	.544		.147	.000

	N	133	133	133	133
Attitudes_Climate	Pearson Correlation	-.083	-.126	1	.008
	Sig. (2-tailed)	.342	.147		.932
	N	133	133	133	133
Attitudes_Meat	Pearson Correlation	.093	-.298**	.008	1
	Sig. (2-tailed)	.289	.000	.932	
	N	133	133	133	133
Info_Avoid_CC	Pearson Correlation	-.081	-.420**	.082	.136
	Sig. (2-tailed)	.354	.000	.346	.119
	N	133	133	133	133
Info_Avoid_Health	Pearson Correlation	-.075	-.332**	.094	.111
	Sig. (2-tailed)	.388	.000	.282	.204
	N	133	133	133	133
Info_Avoidance	Pearson Correlation	-.086	-.371**	.104	.136
	Sig. (2-tailed)	.326	.000	.235	.118
	N	133	133	133	133
Risk_Climate	Pearson Correlation	.103	.168	-.110	-.157
	Sig. (2-tailed)	.238	.053	.207	.071
	N	133	133	133	133
Risk_Meat	Pearson Correlation	-.051	.306**	-.057	-.262**
	Sig. (2-tailed)	.564	.000	.513	.002
	N	133	133	133	133
CC_Exposure	Pearson Correlation	.168	.119	-.215*	-.080
	Sig. (2-tailed)	.054	.171	.013	.357
	N	133	133	133	133

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