Psychological barriers that limit climate-friendly food choices in a South African context

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DECLARATION

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I declare that the above dissertation is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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Summary

By following a climate-friendly diet, consumers have the potential to reduce climate change. However, despite the growing awareness of the climate-friendly food options that are available, consumers still choose foods with a high carbon footprint. Following a survey design, this study aimed to determine the extent to which four psychological processes (denial, conflicting goals and aspirations, tokenism, and interpersonal influence) limit consumers' climate-friendly food choices in South Africa. Data were collected from 151 participants using the Climate-friendly Food Choices Scale and the Psychological Barriers Scale. Regression analysis indicated that conflicting goals and aspirations and denial were the two main psychological barriers to climate-friendly food choices. Overall the barriers were negatively associated with climate-friendly food choices. Gender did not produce a significant effect in the study. Different age groups varied with regards to the extent to which they experienced the psychological barriers, but they did not differ significantly with regards to how often they made climate-friendly food choices.

Key Terms: psychological barriers; climate change mitigation; sustainable food choices; climate-friendly food; pro-environmental behaviour; meat-eating culture; conflicting goals; denial; tokenism; interpersonal influence; age differences; gender differences.

Dedication

This work is dedicated to my dad, Willem, my sister, Yolande, and my brother-in law, Craig. Thank you for believing in me. Without you this would not have been possible.

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Chapter 1: Introduction

The world is becoming increasingly aware of the detrimental effects of climate change and how these impact on the environment. Climate scientists claim that humans are largely responsible for climate change and that certain mitigative and adaptive actions are necessary to reduce this environmental crisis (Intergovernmental Panel on Climate Change, 2014). Agricultural production has been identified as one of the largest contributors to climate change (Garnett, 2008). The processes involved in the production of certain foods, the distribution and the disposal of food all contribute significantly to climate change. Moreover, the effects of climate change, which disrupt the production of food, result in less available food to feed a growing population (Wheeler & von Braun, 2013). To reduce the environmental impact of food production, which could alleviate the effects of climate change and lower the risk of world hunger, the agricultural sector has adopted various climate-friendly production processes. However, in addition to this, it is imperative that consumers reduce their demand for foods that are environmentally taxing and make food choices with the intention to reduce climate-change. That is, consumers should adopt climate-friendly food choices.

Despite the many devastating effects of climate change, including the threat to food security, a large proportion of the population does not consider the environmental impact of their food choices. It is not yet well understood as to why consumers are disinclined to adopt climate-friendly food choices.

The reasoning behind food choices is complex, and includes multiple economic, personal, and social factors that can limit the adoption of climate-friendly food choices. Furthermore, various psychological processes can negatively affect climate-friendly food choices. Many studies have focussed on the economic, personal, and social factors that limit climate-friendly food choices, however, little emphasis has been placed on the

psychological processes that obstruct these choices. Knowledge of the psychological processes that limit climate-friendly food choices can aid the creation and advancement of interventions that successfully communicate and cultivate a culture of pro-environmental consumption.

Gifford and Chen (2017) identified four psychological processes (i.e. conflicting goals and aspirations, denial, interpersonal influence, and tokenism) that act as barriers to climate-friendly food choices.

The current study aimed to assess the extent to which these psychological barriers limit climate-friendly food choices in South Africa. To evaluate these barriers, the current study measured the extent to which the processes, as suggested by Gifford and Chen (2017), limit climate-friendly food choices among a sample of South African consumers. The study also explored whether significant differences exist between males and females, and between different age groups with regards to the psychological barriers and how often climate-friendly food choices are made. By exploring this, the study can contribute towards the development and enhancement of interventions aimed at addressing this important issue.

This study therefore addressed the following research questions:

Question 1: What is the influence of denial, tokenism, interpersonal influence, and conflicting goals and aspirations on climate-friendly food choices?

Question 2: Is an increase in the intensity with which the psychological barriers are experienced associated with a reduction in climate-friendly food choices?

Question 3: Is there a significant difference between males and females with regards to the extent to which they experience psychological barriers to climate-friendly food choices?

Question 4: Is there a significant difference between males and females with regards to how often they make climate-friendly food choices?

Question 5: Is there a significant difference between different age groups with regards to the extent to which they experience psychological barriers to climate-friendly food choices?

Question 6: Is there a significant difference between different age groups with regards to how often they make climate-friendly food choices?

Data were collected using two questionnaires, one to measure climate-friendly food choices and the other to measure psychological barriers to climate-friendly food choices. Regression analysis was employed to explore the extent to which the psychological barriers prevent individuals from making climate-friendly food choices in South Africa. Results indicated that conflicting goals and aspirations and denial were the two main barriers to climate-friendly food choices. Bivariate analysis indicated a negative relationship between climate-friendly food choices and psychological barriers to climate-friendly food choices. Furthermore, group comparisons revealed a significant difference between two of the age groups with regards to the psychological barriers to climate-friendly food choices. Gender produced no significant effects in this study.

The dissertation consists of six chapters:

Chapter 2 which provides the backdrop against which the research impetus originated, emphasises the importance of the research problem by placing it within the broader context from which it was derived.

Chapter 3 discusses relevant literature and demonstrates the necessity to further explore the limiting effects that psychological barriers have on various pro-environmental behaviours, including climate-friendly food choices. .

Chapter 4 addresses the research purpose and questions and discusses the research methods that were followed in the study, including the sampling method, data collection, data analysis, reliability and validity, and the ethical considerations.

Chapter 5 provides the research results.

Chapter 6 discusses the research results, possibilities for future research, as well as the limitations and contribution of the study.

Chapter 2: Contextualising the study

To contextualise the study, this chapter situates the research within the context of climate change and provides an overview of the relationship between climate change and food production and consumption.

Climate change

Climate change, which is a wide-ranging inclusive term, refers to a long-term change in several environmental conditions, including an increase in the earth's temperature, a change in the usual rain or snowfall, rising sea levels, and the growing intensity of extreme weather events for a given place. The increase in the average annual air temperature near the surface of the earth, referred to as global warming, is caused by several heat-trapping gases, or greenhouse gases (GHGs), that are the central cause of the greenhouse effect (Gerber et al., 2013). The primary GHGs are water vapour (H2O), carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O) and ozone (O3) (Gerber et al., 2013).

Climate change has been at the forefront of environmental discussions for decades. Concerned scientists have been warning the global community for epochs that if GHG emissions are not reduced and stabilised, a broad range of environmental risks related to climate change will threaten the wellbeing of both humans and the natural environment. Effects of these risks are now evident on every continent (Intergovernmental Panel on Climate Change, 2014). Rising sea levels and shrinking glaciers are endangering coastal communities, tropical storms are smashing coastlines, and high temperatures, severe rainstorms and droughts have become common. Climate scientists agree that climate change is occurring and that humans are largely responsible for it (American Association for the Advancement of Science, 2009).

Climate change and food production

The agricultural sector, which is responsible for feeding the world, is taking massive strain under the changing and unstable weather patterns caused by climate change that, in turn results in a major threat to food security (Food and Agricultural Organization of the United Nations [FAO], International Fund for Agricultural Development, & World Food Programme, 2015; FAO, 2016b; Wheeler & von Braun, 2013). Increased frequencies of dry spells and droughts, raised temperatures, temperature variability, and changes in precipitation patterns have a negative impact on crop productivity, livestock, fisheries, and forestry (FAO, 2016b). In other words, climate change is jeopardising food security due to the negative impact it has on the processes involved in the production of food.

At the same time, food production and consumption significantly contribute to climate change (Hartikainen, Pulkkinen, Katajajuuri, & Peltonen-Sainio, 2016). Considering GHG emissions per sector. The following divisions are responsible for GHG emissions:

35% - Energy sector

24% - The agricultural, forestry and other land-use sectors

21% - Industry sector

14% - Transport sector

6% - Buildings sector

(See FAO, 2016a.)

In other words, agricultural production generates a considerable amount of GHGs. A comparison of emissions from agriculture by continent indicates that Africa is the third

largest GHG emitter (15 %), preceded by the Caribbean (17%) and Asia (44%) (FAO, 2016a).

The environmental impact of food production can be assessed by performing a lifecycle assessment (LCA). A LCA evaluates a product's environmental impact throughout its entire lifecycle (see Hartikainen et al., 2016) and considers all phases in the lifecycle of food, from agricultural production (including agricultural inputs e.g. imported feed, fertiliser, pesticides) through to processing, packing, transport, retailing, home storage and preparation, and final disposal (Garnett, 2008). Each phase consists of different processes that generate GHGs of which some are more GHG intensive than others. The next section discusses the GHG contributions from three GHG intensive phases in the food lifecycle: Agricultural production, transport, and food loss and waste.

Agricultural production

Agriculture accounts for nearly half of the GHG emissions generated during the lifecycle of food (Garnett, 2008). Globally, livestock production contributes nearly two-thirds of the agricultural sector's total GHG emissions (FAO, 2016a). In other words, the majority of the GHG emissions from the agricultural sector are produced from the processes involved in livestock production. Livestock production is therefore a main area in which improvement is expected to have a significant impact on climate change. Livestock production involves the breeding of cattle, goats, pigs, sheep, poultry and other small stock (Jankielsohn, 2015), of which the production of cattle (beef and dairy cattle) is the largest contributor of GHG emissions (Gerber et al., 2013). In South Africa, the production of beef cattle produces around 72.6 % of the total livestock GHG emissions (Du Toit, Meissner, & Van Niekerk, 2014). The four categories of processes, which are involved in the production of livestock that significantly contributes to climate change, are

feed production, enteric fermentation, manure management, and energy consumption (Gerber et al., 2013).

The production of feed for livestock requires that natural grasslands and forests be converted into arable land to grow feed crops. This results in thousands of hectares of land being converted into crop fields. The conversion of natural ecosystems (e.g. natural grassland and forests) into arable land is referred to as land-use change (Tapia Granados & Carpintero, 2013). This conversion is associated with the oxidation of carbon found in the soil, which releases carbon dioxide into the atmosphere, and contributes to climate change (Benbi, 2013; Gerber et al., 2013). Furthermore, the machinery used for the manufacturing, processing, and transportation of fertilisers burns fossil fuels that release carbon dioxide (Gerber et al., 2013). Last, the use of fertilisers (organic and synthetic), the deposition of manure on crop fields, and the application and management of manure on crop fields, are associated with the release of nitrous oxide into the atmosphere (Gerber et al., 2013). In other words, the production of feed for livestock, which produces significant volumes of GHG emissions into the atmosphere, contributes significantly to climate change.

Enteric fermentation refers to the breakdown of carbohydrates in the stomach (rumen) of ruminant animals (e.g. cattle, sheep, and goats) (Gerber et al., 2013). The breakdown of carbohydrates in the rumen releases methane as a by-product. Other, non-ruminant animals (e.g. pigs and poultry) also produce methane as a by-product during the breakdown of carbohydrates, however the volume of methane produced is significantly less than in ruminant animals (Gerber et al., 2013) and consumption of non-ruminant animals can be accommodated from a climate change perspective (Bryngelsson, Wirsenius, Hedenus, & Sonesson, 2016). In sum, the digestive process of ruminant animals emit large volumes of GHGs that contribute to climate change.

The third group of processes that is responsible for the emission of GHGs, which contribute to climate change, is manure management. Manure management refers to the processes involved in the organisation of livestock manure. Livestock manure is stored and then processed and used as fertiliser for crop production. The manure contains two chemicals that produce GHGs during storage and processing. First, the organic matter in the manure releases methane, and second, nitrogen found in the manure, turns into nitrous oxide when combined with oxygen in the atmosphere (Gerber et al., 2013). The storage and processing of manure are thus responsible for further GHG emissions that contribute to climate change.

The fourth group of processes, energy consumption, which refers to the burning of fossil fuels for the production of energy, releases carbon dioxide into the atmosphere (Gerber et al., 2013). The burning of fossil fuels for energy occurs throughout the entire lifecycle of food. First, during crop production, machinery is used for the manufacture of fertilizers; and for harvesting, processing, and transporting of feed. Second, during livestock production, machinery that burns fossil fuels is used for the construction of buildings, and the processing and transportation of livestock thus further contributing to climate change.

In sum, the production of livestock is the largest contributor of GHGs when compared with the production of other food products. The reduced consumption of meat and dairy products therefore forms part of a climate-friendly diet.

Transport

Transport contributes to climate change through the combustion of fossil fuels. Fossil fuels contain large volumes of carbon, and when these fuels are burned in the presence of oxygen, carbon dioxide is formed (WWF, 2016). Small quantities of nitrous

oxide and methane are also released during this process (WWF, 2016). There are various modes of transport, for example rail, road, water or air that are used to distribute food. Not all modes of transport are equally environmentally taxing, and therefore the environmental impact associated to the transportation phase of food is a combination of the kilometres travelled and the mode of transport used (Heller, 2017). It is often not possible to know which modes of transport were used in the distribution of a product, however choosing a product that has been produced locally (vs abroad) is expected to reduce GHG emissions within this phase of the lifecycle.

Food loss and waste

Food loss and waste refer to foods that could have been consumed but which are removed from the food chain. Food is lost or wasted throughout the supply chain, from agricultural production to the final consumption level. Food loss or spoilage usually occurs during the post-harvest phase (WWF, 2017) and results from various factors, including poor storage facilities and a lack of infrastructure. Losses that occur later in the food chain, due to consumer behaviour (e.g. discarding edible food), is usually referred to as 'food waste' (WWF, 2017). A report by the WWF (2017) indicated that 50% of food is lost or wasted in the agricultural phase, 25% during processing and packaging, 20% during distribution and retail, and 5% at the consumption level. Food loss and waste impact the environment in three ways: First, the decomposition of food in landfills produces GHG emissions. Second, the carbon footprint associated with the lost or wasted product (the sum of the GHG emissions generated throughout a product's lifecycle) and third, unconsumed, decaying foods, which have been removed from the supply chain, exacerbate the problem (WWF, 2017). In other words, not only does the decomposing food produce additional GHGs, beyond its existing carbon footprint, there is also less food available to feed a hungry world. In South Africa, an estimated one third of all food that is produced is lost or

wasted, a staggering statistic if you consider that 26% of households in South Africa experience hunger and a further 28.3% are at risk of experiencing hunger (WWF, 2017).

Climate change and food consumption: Supply and demand

The total environmental impact of food consumption is dependent on the size of the population, the per capita consumption of food (eaten or wasted), and the environmental impact of food produced, transported, and ultimately discarded (Röös et al., 2017). The world population has grown by approximately 1 billion people over the last 12 years and is growing at a rate of 1.10% per year (83 million people per year) (United Nations, Department of Economic and Social Affairs, & Population Division, 2017). It is estimated that if the current population growth is maintained, and food production processes and consumption behaviours remain the same, a 70% growth in food production will be necessary to feed the world's population by 2050 (WWF, 2017). A 70% growth in food production, with the same production and consumption patterns, will undoubtedly place even more strain on the environment. The agricultural sector is therefore faced with the challenge of producing enough food to feed a growing population whilst at the same time reducing the environmental impact of food production. Considering that some foods have a lower carbon footprint than others, it makes sense to reduce the production of foods that have a large negative impact on the environment and instead produce more foods that are less environmentally intensive. In other words, the imperative is to feed the growing population with foods that are environmentally sustainable.

While the agricultural sector contributes significantly to climate change, consumer demand for certain GHG-intensive food products further compounds the situation. South Africa, for example, has seen an increase in the demand for meat (Harding, Courtney, & Russo, 2017; Ronquest-Ross, Vink, & Sigge, 2015) and dairy products (Jankielsohn, 2015) in recent years. Consumers are thus increasing the demand for foods that place a high

demand on the environment. As with many other industries, the agricultural sector operates on the principles of supply and demand, and therefore if the demand for certain types of foods reduces, a decrease in the production of these foods can be expected (Jankielsohn, 2015). In the same way, an increase in the demand of certain foods will lead to an increase in the production of these foods. The responsibility to select foods that have a lower carbon footprint therefore lies with the consumer. By reducing the demand for foods that have a high carbon footprint, consumers can decrease food related GHG emissions and consequently help mitigate climate change (Wilkes, Kiff, Wollenberg, & White, 2016). It is evident that changes to both the supply and the demand of food will be necessary to achieve a sustainable food future for the world (Hyland, Henchion, McCarthy, & McCarthy, 2017; Machovina, Feeley, & Ripple, 2015; Röös et al., 2017; Scherer & Verburg, 2017). This means that consumers need to consider the impact that their food choices have on the environment and opt for foods that have a lower negative environmental impact. In sum, consumers should adopt climate-friendly food choices.

Climate-friendly food choices

Climate-friendly food choices can be defined as the decisions that consumers make with the intention of reducing the impact of their food consumption practices on the environment. This includes choosing food products that have a lower carbon footprint and monitoring food waste to reduce GHG emissions. Climate-friendly food choices therefore relate to a demand for more plant and fewer animal-based foods (Åström, Roth, Wranne, Jelse, & Lindblad, 2013; Harwatt, Sabaté, Eshel, Soret, & Ripple, 2017; Machovina et al., 2015; Springmann, Godfray, Rayner, & Scarborough, 2016; Wilkes et al., 2016), purchasing locally and organically grown food (Åström et al., 2013) and minimising food waste (Åström et al., 2013; Wilkes et al., 2016).

The shift towards a more climate-friendly diet can have a significant impact on lessening climate change. For example, in the European Union (EU) a 50% reduction in the consumption of meat, dairy, and eggs could achieve a 40% decline in nitrogen emissions, 25 to 40% reduction in GHG emissions, and 23% per capita less land use for crop production (Westhoek et al., 2014). Various campaigns, such as Support Meat Free Mondays (‘Support Meat Free Mondays’, n.d.), have been introduced to provide the public with information about climate-friendly food choices that can be made on a personal level to reduce the environmental impact of food. Many people are concerned about climate change and are already making food choices with the intention of decreasing their contribution to the problem. However, the demand for GHG intensive food products is increasing. Why then, in light of the devastating consequences of climate change, are people not adopting climate-friendly food choices? To answer this question, it is important to first evaluate how food choices are made, that is, determining the factors that influence food choices.

The next chapter discusses the various factors that motivate food choices, as well as an overview of theoretical frameworks that predict pro-environmental behaviours, including climate-friendly food choices.

Chapter 3: Literature Review

Although food is a necessity – humans need food to survive – what we eat is also, largely, a personal choice. In other words, what people choose to eat goes beyond a biological need for food. Our food choices include our personal preferences, which, to a large extent, are determined by what food is available, our traditional cuisine practices (which are transmitted from one generation to the next and are an expression of our cultural identity), and with whom we associate. Our food choices thus function in, and are bound to, our social contexts. To understand why people do not make climate-friendly food choices, it seems necessary to explore why they make certain food choices in the first place, that is, to explore which factors limit, and which motivate, various food choices. The economic factors that limit food choices, as well as the factors that stimulate various food choices are discussed below. The discrepancies between consumers' self-reported barriers and motivators, and their actual food choice incentives are highlighted.

Food choices: Personal preference and the social context

Economic factors, such as the availability and cost of products inevitably influence whether an individual will purchase and consume them (Wang, Liu, & Qi, 2014; Yadav & Pathak, 2016). The unavailability and high cost of a product will limit the consumption of the product. Despite the seemingly obvious impact that availability and cost have on food choices, cost only sometimes has a significant impact on food choices (Vainio, Niva, Jallinoja, & Latvala, 2016). Indeed, the impact of cost on food choices is secondary to other, more influential, factors, such as health and environmental concern (Royne, Thieme, & Levy, 2018; Tobler, Visschers, & Siegrist, 2011). In other words, if a consumer's food choices are not limited by economic factors, other incentives take importance when making food choices. These factors are discussed next.

As stated, food choices seem to be influenced by an individual's personal preferences: These include the taste of food, the quality of products, how convenient the product is to prepare, and healthiness (i.e. preferences regarding the health benefits of the food). Personal preferences are influenced not only by a particular social context, but are also maintained in this context. In other words, food choices aim to satisfy the individual's personal preferences in the particular social contexts in which the individual functions.

Various studies have found a relationship between hedonistic motivators and food choices (Graça, Calheiros, & Oliveira, 2015; Hartikainen, Roininen, Katajajuuri, & Pulkkinen, 2014; Pohjolainen, Vinnari, & Jokinen, 2015). Hedonistic motivators are driven by the pursuit of pleasure (e.g. the taste of food). Taste and quality of food products are strong motivators of food choice. Among 1,306 Australian university students, the majority of the learners rated taste and quality as their strongest motivators when making food choices (Kourouniotis et al., 2016). Similarly, among Finnish consumers, taste, quality, and price (an economic barrier) were rated the most important considerations when making food choices (Hartikainen et al., 2014). Even participants with pro-environmental attitudes, who scored environmental friendliness as an important factor to consider when making food choices, scored taste, quality, product safety, domestic product, and healthiness higher than environmental friendliness (Hartikainen et al., 2014). The convenience with which certain products can be prepared (Vainio et al., 2016; Yadav & Pathak, 2016), pro-environmental self-identity (Albani, Butler, Traill, & Kennedy, 2018; Carfora, Caso, Sparks, & Conner, 2017; Haverstock & Forgays, 2012), and concerns about health (Hartikainen et al., 2014; Schösler, de Boer, & Boersema, 2014) also influence food choices. Furthermore, food choices are influenced by the consumer's social context: Food is often consumed with others (e.g. with friends and family) and forms part of social events (e.g. weddings). Consequently, the valuation of traditions (Pohjolainen et

al., 2015) and the social context (Pohjolainen et al., 2015; Puska, Kurki, Lähdesmäki, Siltaoja, & Luomala, 2018) influence the food choices that a consumer will make.

In addition to personal preferences and the social context, different food choices are also influenced by different incentives. Vainio et al. (2016) used The Eating Motivation Survey (TEMS), which measures 15 different reasons for food choices, to determine which rationalisations shaped participants' preferences with regards to consuming various food types (i.e. beef, beans, and soy products) among Finnish consumers. Participants, who were divided into groups based on self-reported consumption patterns, were compared with regards to the factors that motivated these patterns. Results indicated that the 'beef only' group (i.e. participants who did not consume beans or soy) more strongly endorsed convenience and price as determining factors, than the 'established beans and soy' group, who advocated health, natural concerns, and weight loss aspects. The group that was undergoing a dietary change from beef to beans and soy products, when compared with the 'established beans and soy' group, strongly endorsed health, natural concerns, sociability, price, and social image as their eating motives. Participants who consumed meat, but who had a past attempt at increasing their beans and soy intake, more strongly endorsed price as a motivator when making food choices, than the 'established beans and soy' group.

It is clear that people who follow different diets have different incentives for their choices. Given this, and considering the significant impact that meat production and consumption have on the environment, it is pertinent to consider which factors motivate the consumption of meat. These factors are discussed next.

Factors motivating meat consumption

Macdiarmid, Douglas, and Campbell (2016) conducted focus groups with 83 participants to determine which factors motivated their consumption of meat, whilst also taking into account their awareness of the environmental impact of meat production. The findings indicated a reluctance to reduce meat consumption, even after being presented with evidence of its impact on the environment. Reasons for their unwillingness to reduce meat consumption were related to the enjoyment of meat, and the notions that meat is a traditional part of a meal and a necessity in the diet. Participants in that study also indicated that reducing one's meat consumption would be difficult as others are likely to continue eating meat, and that meat plays an important role in special occasions. The centrality of meat as nutritious, tasty, and the typical centrepiece of a meal, is sometimes challenged by feelings of guilt, disgust, and threats to health. However this is often not strong enough to visibly influence meat consumption (Bohm, Lindblom, Åbacka, Bengs, & Hörnell, 2015). A quantitative study (N = 1890) by Pohjolainen et al. (2015), which aimed to determine the barriers that prevented participants from reducing their meat consumption and their reluctance to follow a more plant-based diet, yielded similar results. Again, meat was regarded as enjoyable and preferred as it is familiar and nutritious. Furthermore, they were reluctant to adopt a vegetarian diet as plant-based dishes are 'complex' and difficult to prepare. Also, demographic factors, namely being male, being young, the absence of a vegetarian family member or friend, having low education, having children in the household, and living in a rural setting increased participants' reluctance to reduce their meat consumption (Pohjolainen et al., 2015). It is, however, important to note that many of the studies, which investigated food choices, use self-reported data and are therefore dependent on the consumer's understanding of his/her own food choice motives and barriers. Indeed, are people aware of the incentives that drive their actions? In a study

by Mäkiniemi and Vainio (2014), in which social and behavioural sciences students were asked to rate the barriers that limit their climate-friendly food choices, results indicated that participants were unaware of the factors that limited their food choices. Participants rated high prices as their largest barrier, yet observation of their actual food choices revealed that habit and scepticism about climate change were found to have a stronger influence on their decisions than price. In other words, they were unaware that their views on climate change and their habits had a stronger influence on their food choices than the cost of a product. Therefore, it seems that people are not necessarily aware of their own food choice motives and therefore self-reported motives and barriers are possibly not the best indicators of the real reasons why people make certain food choices.

This section provided insight into the factors that consumers perceive as important when making food choices. It also highlights the possible discrepancy between real and perceived motivators of food choices. Climate-friendly food choices are distinguishable from food choices in general in that they are made with the intention to reduce climate change. In other words, making climate-friendly food choices can be regarded as pro-environmental behaviour. The various factors that influence such behaviour are discussed in the next section.

Climate-friendly food choices

As mentioned, climate-friendly food choices are made with the intention to reduce climate change. Hence, these food choices, which extend beyond personal preferences and the social context, include the incentive to conserve the environment. The question therefore is, if consumers are aware of the environmental impact of their food choices, why are they reluctant to adopt these pro-environmental behaviours? In other words, what is it that causes the inconsistency between the awareness of the need to act pro-environmentally and acting pro-environmentally? The aptly named, ‘knowledge-behaviour

gap' has been researched extensively and many theories have been developed in an attempt to explain and predict pro-environmental action or the lack thereof (for a review see Kollmuss & Agyeman, 2002). The next section provides a discussion of some of these theories and recent research on the topic.

Illuminating the knowledge-behaviour gap

The Value-Belief-Norm Theory.

A widely used theory in the prediction of pro-environmental behaviour is the Value-Belief-Norm Theory (Stern, 2000; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). The theory suggests that pro-environmental behaviour can be predicted by various values, beliefs, and norms that are held by an individual. If these values, beliefs, and norms support the pro-environmental action in question, and the individual is capable of performing the behaviour and is not constrained to do so, then the pro-environmental action will be adopted (Stern et al., 1999). The theory suggests a chain reaction that starts with personal values (i.e. biospheric, altruistic, and egoistic values) that activate a series of beliefs, consisting of ecological worldviews (i.e. a belief about how humans and the environment relate), knowledge about the adverse consequences that could influence valued objects, and a perceived ability to reduce the threat. If the individual values the environment, has a pro-environmental worldview, perceives the self or a valued other/object to be under threat, and believes that he/she can reduce the threat, this will activate the individual's 'pro-environmental norms' (e.g. "Do I feel a responsibility or obligation to reduce the threat?"). If the person experiences an obligation to respond, this will most likely result in them doing so. In other words, the values, beliefs, and norms that an individual hold can predict whether they will adopt climate-friendly food choices.

The values, beliefs and norms that predict climate-friendly food choices seem to be culture dependent, that is, consumers' food choice motivations vary across culture. Ruby,

Heine, Kamble, Cheng, and Waddar (2013) investigated the values that motivated different food choices in two samples from different cultures, namely a Euro-American sample and an Indian sample. The participants' food choices were categorised as either omnivorous or vegetarian. Omnivores follow a diet that includes the consumption of meat and fish, whereas vegetarians do not consume meat or fish as part of their diet. The study compared Euro-American omnivores with Euro-American vegetarians, and Indian omnivores with Indian vegetarians with regards to, among other things, their concern for the impact of their food choices on the environment and animal welfare, religiosity, and their moral foundations. The results showed that Euro-American vegetarians were more strongly motivated than Euro-American omnivores by the impact of their food choices on the environment and animal welfare. Furthermore, their endorsements of the values of universalism were stronger, and their endorsements of the values of Right-wing authoritarianism were weaker than Euro-American omnivores. Indian vegetarians and omnivores, however, did not significantly differ with regards to these values. However, Indian vegetarians were more religious, had a stronger belief that eating meat pollutes one's spirit and personality, and endorsed ethics related to purity, authority and in-group concerns more than their omnivorous counterparts. However, Euro-American omnivores and vegetarians did not significantly differ from each other with regards to these values. This shows that the incentives that encourage vegetarianism vary depending on the cultural context, and it can, therefore, be reasonably argued that the values that advance climate-friendly food choices also vary between cultures.

Pohjolainen et al. (2015) investigated the barriers experienced by consumers to reduce their meat intake and follow a more plant-based diet. They found that the extent to which people valued social justice, tradition, and wealth, influenced their barrier perceptions. Participants were asked to rate how much they valued various social justice

values (e.g. individual freedom, environmental protection, and rights for sexual minorities), tradition (e.g. religion, home region, and the Finnish culture), and wealth (e.g. high income and high social status). Results indicated that consumers who valued social justice did not experience barriers to reduce their meat consumption as intensely as individuals who valued tradition and wealth. In other words, individuals who placed a high value on, for example, protecting the environment, experienced less frustration to reduce their meat intake than those who valued, for example, a home culture in which meat consumption plays an important role. Therefore, an alignment between what a person values and certain actions can be expected to reduce the barrier perceptions to performing a behaviour. The tendency to behave consistently with one's values and beliefs is in step with the Theory of Cognitive Dissonance (Festinger, 1957). This theory postulates that people experience mental discomfort when there is a discrepancy between their beliefs, ideas, values and/or behaviour (e.g. if they hold two or more contradictory beliefs, ideas, values or if their values and their behaviour are incongruous). For example, when people smoke (behaviour) and they know that smoking causes cancer (belief) they are likely to experience cognitive discomfort. In such cases something must change (e.g. either their behaviour or their beliefs) to eliminate the dissonance and thus reduce the discomfort. Attempts to reduce cognitive dissonance can be achieved in various ways. For example, in a study by Šedová, Slovák, & Ježková (2016), environmental studies graduate students, who were aware of the impact of meat consumption on the environment, and therefore experienced cognitive dissonance when consuming meat, dealt with this discrepancy in a number of ways. They detached themselves from the meat they ate (i.e. they avoided building relationships with the animals that they ate); they rationalised their behaviour (i.e. they justified their choices, often with hedonistic reasons); they made promises of improved future behaviour; they perceived a change in their behaviour (even though

sometimes there was no actual change); and they concealed or repressed information that contradicted their behaviour. They, therefore, used various tactics to make themselves feel more at ease with their behaviours that were not in line with their values, beliefs, and norms.

The Theory of Planned Behaviour

A second theory, that is frequently applied in the prediction of pro-environmental behaviour, is the Theory of Planned Behaviour (TPB) (Ajzen, 1991). The TPB is an extension of the Theory of Reasoned Action (Fishbein & Ajzen, 1975), with an additional variable included in the model, namely 'perceived behavioural control' (PBC). The TPB states that intentions to perform a certain pro-environmental behaviour can be predicted by three variables, namely; attitudes towards the behaviour (i.e. the degree to which the person has a favourable inclination towards the behaviour), subjective norms (i.e. perceived social pressure to perform the behaviour), and PBC (i.e. perceived ease/difficulty of performing the behaviour) (Ajzen, 1991). If an individual has a positive attitude towards the behaviour, experiences social pressure to perform the behaviour, and perceives him/herself capable of performing the behaviour, then the TPB predicts that the individual will have strong intentions to perform the specific behaviour. Furthermore, intentions to perform the specific behaviour and PBC predict whether an individual will perform the behaviour. Ajzen (1991) suggested that the variables would differ in predictive strength depending on the behaviour and proposed that future research should investigate the predictive strength of attitudes, subjective norms, and PBC with regards to various different behaviours (e.g. food choices, energy consumption).

Several researchers have used the TPB model as a framework to test the predictive values of various additional predictor variables to pro-environmental behaviour. Dowd and Burke (2013) included three additional variables to the original TPB model to measure the

influence of ethical factors on the intention to purchase sustainably sourced food products. The three additional factors were: Positive moral attitude, ethical self-identity, and eight food choice motives (health, convenience, ethical values, mood, sensory, price, weight, and religion). The original TPB model explained 62% of the participants' purchase intentions. The inclusion of positive moral attitude and ethical self-identity in the model, added an additional 11% to the predictive value of the original model. In this model, positive moral attitude, pro-environmental attitude, and PBC were the strongest predictors of intention, followed by ethical self-identity and social norms. With the inclusion of the eight food choice motives, ethical values and health predicted intentions to purchase sustainably sourced foods. However, with the addition of the food choice motives, ethical self-identity was no longer a significant predictor of intention. The final model predicted 76% of the variance in intentions to purchase sustainably sourced foods. In a similar study, which investigated consumers' intentions to purchase organic food, results indicated that, of the original TPB model, attitudes towards organic food and PBC, but not social norms, were significant predictors of intentions to purchase organic food (Yadav & Pathak, 2016). When moral attitude, health consciousness, and environmental concern were added to the original TPB model, results indicated that moral attitude and health consciousness, but not environmental concern, significantly predicted intentions to purchase organic food. Health consciousness and environmental concern however significantly influenced attitude towards organic food. Moral attitude and health consciousness added 17.4% and 4.6% respectively, to the predictive value of the model in determining intentions to purchase organic food.

In a review of 17 studies that used the TPB to predict a variety of pro-environmental behaviours, Scalco, Noventa, Sartori, and Ceschi (2017) found that a favourable attitude towards a behaviour was (a) the strongest predictor of the intention to

perform pro-environmental behaviours and (b) directly associated with the behaviour. In the review of Scalco et al. (2017) only 30% of the studies reported a positive correlation between intention and behaviour. This finding leaves the predictive strength of intention open for further research (Scalco et al., 2017). In other words, it is not clear to what extent the intention to perform a behaviour predicts whether an individual will perform the behaviour. Broomell, Budescu, and Por (2015), who evaluated the data from 25 samples in 25 countries, which included 21 different languages, found that a pro-environmental worldview, personal experience with the effects of climate change, and self-efficacy beliefs (i.e. a belief in one's ability to perform a behaviour) directly predicted pro-environmental behaviour. The least important predictors of pro-environmental behaviour in that study were gender, age, belief in the free market system, political affiliation, and knowledge about climate change (Broomell et al., 2015).

In sum, several theories attempt to explain the knowledge-behaviour gap, of which two were discussed in this section. The V-B-N Theory and the TPB have been used in many studies that aim to predict pro-environmental behaviour. Several additional predictors, such as moral attitude, ethical self-identity, environmental concern, pro-environmental worldview, and perceived self-efficacy have been suggested to influence pro-environmental behaviours. To date, however, there has been no proposed framework that satisfactorily predicts pro-environmental behaviour (see Ding et al., 2018; Kollmuss & Agyeman, 2002). Kollmuss and Agyeman (2002) suggested that a single framework, which includes all the determinants that influence pro-environmental behaviour, would be too complex to apply and understand. However, Gaspar, Palma-Oliveira, & Corral-Verdugo (2010) suggested that the failure to explain pro-environmental behaviour is due to an overestimation of the predictive value of positive determinants (i.e. positivity fallacy) and a disregard of negative determinants (i.e. barriers), as well as a lack of psychological

explanations, and an underestimation of the influence of unconscious processes. Therefore, to predict pro-environmental behaviour more accurately, it is important to consider the psychological processes that can act as barriers between pro-environmental knowledge and pro-environmental behaviour. A discussion of the psychological processes that influence pro-environmental behaviour is provided in the next section.

Psychological barriers to pro-environmental behaviour

The process model

Moving beyond the descriptive and predictive frameworks (such as those discussed above), to explain how psychological, non-psychological, conscious, and unconscious processes interact to constrict or prohibit pro-environmental behaviour, Gaspar (2013) suggested a *process model* of psycho-social barriers and constraints based on an adaptation of the DN-Work model ("Didn't-work") (Gaspar et al., 2010). The process model suggests that every individual with his/her dispositional characteristics, functions within a context that has situational characteristics. Dispositional characteristics refer to the individual's motivations, general tendencies, values, worldviews, attitudes, individual traits (e.g. altruism), and mental representations of the self and the world (e.g. beliefs about technology, the economy, and nature). Situational characteristics can be non-psychological or psychological. Non-psychological characteristics can be divided into two groups: The physical world (e.g. the built environment) and the non-physical world (e.g. economical and socio-demographic). Psychological situational characteristics refer to our subjective meanings and interpretations of situations (i.e. the social context). The individual constructs a personal truth within this situational context that is guided by certain motivational and cognitive processes that determine how he/she collects, analyses, and interprets information in order to derive meaning from them. These motivational and cognitive processes are guided by certain principles. Motivational processes are guided by

three principles. First, people want to master their environment, in other words, they aim to understand their environment, make predictions about their environment, and receive rewards as a result of their mastery (e.g. through PBC, to achieve a desired outcome). Second, they strive for a sense of connectedness with others and social support, and third, they want to be perceived in a positive way by others. Cognitive processes are also guided by three principles: First, people are conservative, that is, they are slow to change their views and their behaviours. Second, they use the information that is most accessible to them to guide their thoughts, emotions, and behaviours; and third, despite people's capability to systematically work through information, they often approach situations in a superficial way that require low effort (heuristic processing). Therefore, a person with various dispositional characteristics, that finds him/herself in a situation with various psychological and non-psychological characteristics, will collect, analyse, and interpret their world by using multiple motivational and cognitive guiding principles, to derive their own meaning. It is this interaction between dispositional and situational characteristics that create the conditions that either constrict pro-environmental behaviour or facilitate anti-environmental behaviour. For example, a situational characteristic can cue certain dispositional characteristics that could, for instance, activate certain attitudes, social norms, goals, and habitual behaviours that contradict pro-environmental behaviours or, alternatively, that are in line with anti-environmental behaviours. The individual could be aware (i.e. conscious) or unaware (i.e. unconscious) of this cueing effect and can selectively (consciously or unconsciously) pay attention to certain cues. In other words, despite a situational characteristic that may cue a set of pro-environmental dispositional characteristics, the person's mood or current goals may influence whether, or not, he/she will pay attention to the cue. Consequently, various goal specific, conscious or unconscious barriers or constraints are formed. These barriers and constraints can interact

with each other to ultimately either prohibit pro-environmental behaviour or facilitate anti-environmental behaviour.

Hence, it can be argued that the gap between knowledge and behaviour is better explained if the psychological processes (conscious or unconscious) that act as barriers to the formation of pro-environmental behaviour are considered in conjunction with the positive determinants of pro-environmental behaviour. The next section provides a discussion of psychological barriers that limit climate-change mitigative behaviour.

Psychological barriers that limit climate change mitigation and adaptation

Gifford (2011) suggested approximately 30 psychological processes that can limit an individual's involvement in climate change mitigation and adaptation. He divided the various processes into seven groups, namely: limited cognition, ideologies, comparisons with others, sunk costs, discredence, perceived risk, and limited behaviour.

Limited cognition.

The first group of processes refers to the effect of limited cognitive processes on climate change mitigative responses. Humans are not always rational in their thinking and often employ mental shortcuts (heuristics) to process information. These shortcuts may lead to errors in judgement (Tversky & Kahneman, 1974). In other words, instead of processing information in a logical, systematic manner, cognition is restricted under certain conditions and judgement is jeopardised as a result. Gifford (2011) states that the 'slow' and 'distant' nature of climate change, the amount of information people receive about climate change, and people's perceptions of their ability to influence climate change, can restrict their cognitive capacity to process climate change information and, as a result, limit their climate change mitigative responses. First, the human brain has not developed much since it reached its maturity, prior to the development of modern-day agriculture,

when people were believed to be concerned about their immediate environment, exploitable resources, and direct threats from their environment (Gifford, 2011). Climate change, which is slowly unfolding and often distant in nature (e.g. climate scientists often describe effects that will only be visible in the year 2050) is, as a result, often difficult for humans to conceive as a threat that requires immediate attention. In other words, the difficulty of perceiving climate change as a real threat, could make someone reluctant to respond to it as such. Second, climate change is a complex issue and many people do not understand the causes and effects of it (De Boer, De Witt, & Aiking, 2016). This can result in complete ignorance or a lack of understanding, and doubt as to whether climate change is real and whether humans, do in fact, influence it (Gifford, 2011). Uncertainty or an inability to understand climate change can reduce an individual's willingness to adopt climate change mitigative action (Gifford, 2011). A person could say: "I don't understand how this is a problem or I am not convinced that climate change is an issue and therefore I will not change my behaviour". The inaccurate perceptions of others' opinions or pluralistic ignorance, could also result in people keeping quiet about what they do know about climate change (self-silencing), due to a fear of being perceived as incompetent in a conversation about climate change (Geiger & Swim, 2016). The third issue refers to the effect that the distant nature of climate change has on people's risk perceptions. Climate change is often communicated in terms of risks that will be visible in the distant future (e.g. Alexandratos & Bruinsma, 2012). This apparent lack of imminent danger can result in the undervaluing of these risks, which, in turn, reduces people's willingness to adopt mitigative action (Gifford, 2011). Research on the effects of 'psychological distance' suggests that proximity of climate change may increase concern and intentions to adopt desirable behaviours in some people (Jones, Hine, & Marks, 2017; Milfont, Evans, Sibley, Ries, & Cunningham, 2014; Soliman, Alisat, Bashir, & Wilson, 2018), but not in others

(Schuldt, Rickard, & Yang, 2018). An individual is more likely to respond to threats that are perceived as close than those that are distant because he/she is unsure whether they will materialise, and is therefore reluctant to change behaviour to reduce a risk that may not even occur (Brügger, Morton, & Dessai, 2016). Simply reducing the distance between people and the effects of climate change is, however, not enough to elicit mitigative behaviour (Brügger, Dessai, Devine-Wright, Morton, & Pidgeon, 2015; Brügger et al., 2016). These disparate findings suggest that further research is necessary to understand the effect that proximation of risks has on people (Brügger et al., 2015). The fourth issue concerns the effect that the amount of information that people receive about climate change (e.g. through campaigns, news channels, documentaries, TV shows) has on their reactions to climate change. Too much information could result in sensory overload and environmental numbness, which may cause an individual to shift his/her attention away from the incoming information (Gifford, 2011). In other words, people become numb to the doom and gloom of climate change. The fifth example refers to the tendency to overestimate the likelihood of positive outcomes and underestimate the likelihood of negative outcomes, also known as optimism bias (Sharot, 2011). Feeling overly optimistic about the future could leave people feeling that there is no need to change their behaviour in order to mitigate negative consequences (Gifford, 2011; Weinstein, Klotz, & Sandman, 1988). The last example of limited cognition, referenced by Gifford (2011), is the effect that the perception of low self-efficacy and low response-efficacy has on an individual's response to the threats of climate change. People tend to avoid behaviours if they feel they cannot cope with them (Bandura, 1977). Increased self-efficacy (i.e. a person's belief in his/her ability to succeed in a specific situation) reduces fear and increases the chance that someone will feel competent to adopt a behaviour (Bandura, 1982). This was found in a study by Hunter and Röös (2016) in which participants who had high self-efficacy and

response-efficacy perceptions regarding the reduction of meat consumption, were more willing to reduce their meat intake.

Ideologies.

The second group of psychological factors, identified by Gifford (2011), relate to ideologies that limit pro-environmental behaviour. Ideologies are systems of beliefs about the world, or the 'lenses' through which a person perceives the world. Should the ideologies held by an individual, be inconsistent with pro-environmental behaviour, this could limit or prevent his/her willingness to adopt pro-environmental behaviour (Gifford, 2011). Gifford (2011) provided a few examples of ideologies that are inconsistent with pro-environmental behaviour. First, a belief in the freedom of commons, that is a belief that there should be open access to natural resources for all: This notion, which often leads to the exploitation of resources (see Hardin, 1968), contradicts the pro-environmental aim to consume resources in a sustainable manner (Gifford, 2011). Second, a belief in a supra-human power (e.g. Mother Earth), which protects the world against disaster, makes it unnecessary to take pro-environmental action as an individual or a collective (Gifford, 2011). Third, a belief that technology will save the world from disaster (techno-salvation) inevitably also reduces one's responsibility to adopt pro-environmental behaviour (Gifford, 2011). Last, a belief in the status quo of systems, in other words a belief that systems should not change will naturally limit an individual's adoption of new behaviours to protect the environment (Gifford, 2011). Recent findings link lay beliefs about the world and political beliefs about the ideal nature of society to climate change scepticism. Soliman and Wilson (2017), for example, note how beliefs about the stability or malleability of the world can influence an individual's perception about climate change and climate change mitigation. People who believe that the world is stable and unchanging, in comparison with people who believe that the world is malleable, are more

sceptical about change, be it for the worse or for the better (Soliman & Wilson, 2017). With regards to political beliefs, Rossen, Dunlop, and Lawrence (2015) found that right-wing individuals, as well as those who endorse morality related to the preservation of the social order and economic freedom are more likely to be sceptical of climate change than those individuals who endorse morality of harm avoidance and fairness. Thus, climate change scepticism reduces intentions to adopt climate change mitigative behaviour (Macdiarmid et al., 2016; Nuttavuthisit & Thøgersen, 2017; Soliman & Wilson, 2017).

Comparisons with others.

The third group of psychological processes suggested by Gifford (2011) that limit climate change mitigative behaviour is the comparison with others. People tend to compare themselves with others in an attempt to evaluate their own opinions (Festinger, 1954) and modify their own opinions to fit with those of their in-group (Asch, 1951). People therefore strive for conformity with their peers and with society. If the social opinion refutes pro-environmental behaviour, this could result in the rejection of the pro-environmental behaviour (Gifford, 2011). The impact that social pressure has on food choices has been noted in various studies. Graça et al. (2015), for example, indicated how regular meat eaters experienced social pressure to eat meat and therefore were reluctant to change their behaviour. Hunter and Röös (2016) noted that requests from family members to eat meat was a significant barrier for people to reduce their meat intake, and participants who started consuming meat again after having been vegetarian/vegan for a while mentioned that a lack of social support was one of the reasons for their relapse (Hodson & Earle, 2018). However, despite the negative impact that social influence may have on pro-environmental behaviours, it can also have a positive impact on climate-friendly food choices. In a study by Puska et al. (2018) participants were more likely to purchase organic food when their status motive (i.e. a desire to attain social standing) was activated, and

they thought that someone would notice their purchase, indicating that comparisons with others can also be used to promote pro-environmental behaviour. In short, however, for as long as the social norm contradicts pro-environmental behaviour, the need to conform will act as a barrier to climate change mitigative behaviour.

Sunk costs.

The fourth group of psychological processes that limit climate change mitigative behaviour, refers to the influence of the perception of sunk costs on additional investments of time, money and behaviour patterns (Gifford, 2011). Sunk costs refer to situations in which an individual is faced with the choice to withdraw from a course of action in which he/she has already made an investment, for example money, effort, or time (Arkes & Blumer, 1985; Garland & Newport, 1991). People commit the sunk cost fallacy when they continue on a course of action because they had already invested in it (Arkes & Blumer, 1985). In other words, if someone spent time searching for a car and then spent money purchasing it and is now accustomed to driving it to work every day, this person would probably be hesitant to cast aside their prior investments (i.e. time, money and behavioural investment) to instead ride a bicycle to work. Climate change mitigative behaviours often require an individual to cast aside prior investments, to modify behaviours, and to deal with conflicting goals, or abandon aspirations (Gifford, 2011). Gifford (2011) explained that investments of money, time and behavioural patterns are useful as they create order in one's life and they free up time and money to pursue other goals. However, the difficulty associated with 'losing' investments that have already been made often stands in the way of other pro-environmental investments. Behavioural momentum, or habit, seems to have a strong impact on whether an individual adopts new behaviours. Habits, which are goal-directed and automatic behaviours (Gaspar et al., 2010), form when an individual repeatedly responds in a specific way to cues in a stable context, and associations are

formed between the cues and the responses (Rothman, Sheeran, & Wood, 2009). Habits are usually outside a person's awareness and control (Gaspar et al., 2010) and breaking a habit requires of an individual to practice self-control over the cues that activate the habit (Rothman et al., 2009). However, because habits can work as an unconscious behaviour, they can make anti-environmental goals stronger and more accessible than pro-environmental behaviour without the individual realising this (Gaspar et al., 2010). In other words, it is not easy to break a habit. Many people follow a specific diet, with little variation and it is therefore not surprising that habit has been found to be a strong barrier in the reduction of meat consumption (De Boer, Schösler, & Aiking, 2014; Graça, et al., 2015; Graça, Oliveira, & Calheiros, 2015; Hunter & Röös, 2016), a predictor of fruit and vegetable consumption (Albani et al., 2018), and a barrier to dietary change (Vainio et al., 2016).

Another aspect of sunk costs are that values, goals, and aspirations may be in contradiction with pro-environmental behaviours (Gifford, 2011). Gifford (2011) posits that the goal to 'get ahead' often results in a person engaging in many actions, such as buying a big house or using air transportation, that contradict pro-environmental goals. This is in line with the V-B-N Theory that was discussed earlier. Recent research has indicated that people who are intrinsically motivated (vs extrinsically motivated) are more likely to display pro-environmental behaviours. Unanue, Vignoles, Dittmar, and Vansteenkiste (2016) noted that a focus on external rewards (e.g. money, image, fame) versus internal rewards (e.g. self-development, community involvement, affiliation), conflicts with being concerned about the welfare of others and nature and are associated with less pro-environmental behaviour. This finding was replicated in a study by Jia, Soucie, Alisat, Curtin, and Pratt, (2017) in which self-transcendent moral values of care

and concern were positively associated with pro-environmental involvement, and values of self-enhancement and achievement were related to low pro-environmental involvement.

Discredence.

The fifth group of factors, discredence, refers to climate change scepticism, mistrust in information sources, and in programmes that encourage climate-friendly behaviour choices (Gifford, 2011). Gifford (2011) explained that individuals are unlikely to take directions from those they do not trust. Scepticism about climate change can be divided into two categories, namely: Epistemic scepticism, which is a disbelief in the status of climate change as a scientific and physical phenomenon; and response scepticism, which is a disbelief in the efficacy of actions that can be taken to mitigate climate change (Capstick & Pidgeon, 2014). Both epistemic and response scepticism are significantly negatively associated with climate change concern (Capstick & Pidgeon, 2014). In other words, the more doubtful an individual is about climate change, the smaller the chance they are concerned about the phenomenon. Also, the more sceptical an individual is about the seriousness of climate change, the less willing he/she will be to perform climate change mitigative behaviours (e.g. reduce meat consumption) (De Boer, Schösler, & Boersema, 2013). The opposite is true for individuals and societies with high levels of generalised trust. The higher the levels of generalised trust (i.e. "I believe that people can be trusted"), the stronger the association between climate change concern and pro-environmental behaviour (Tam & Chan, 2018). Similarly, trusting experts' (e.g. scientists) views is associated with a belief in climate change (Mase, Cho, & Prokopy, 2015).

Perceived risk.

The sixth group of factors, which limit climate change mitigative behaviour, refers to the risks that are associated with changing one's behaviour (Gifford, 2011). People are generally risk aversive and try to avoid losses. If the risks associated with a new behaviour

are too big then a person might choose to rather avoid the behaviour. There are various possible risks involved in adopting pro-environmental behaviours. Gifford (2011) refers to the following six risks: Financial (i.e. "will I lose too much money?"), functional (i.e. "will this work?"), physical (i.e. "is this safe?"), social (i.e. "what will others say?"), psychological (i.e. "how will my self-esteem suffer if this does not work?"), and temporal (i.e. "will I lose too much time?"). If the risks associated with adopting the pro-environmental behaviour are too large, then the individual might choose not to adopt the pro-environmental action in an attempt to reduce possible losses.

Limited behaviour.

The last group of psychological barriers, suggested by Gifford (2011), refers to the adoption of climate change mitigative behaviour that is insufficient and limits further pro-environmental behaviour. In the event that an individual has overcome the psychological barriers mentioned in the preceding discussion, and has adopted climate change mitigative behaviour, Gifford (2011) explained that there are two additional psychological barriers that can prevent adequate pro-environmental action. The first, tokenism refers to the adoption of low cost and uncomplicated behaviours over expensive and difficult behaviours, regardless of how effective they are in mitigating climate change (Gifford, 2011). As was noted by a participant in a study by Capstick and Pidgeon (2014, p. 393) certain mitigative actions are "more about making us feel better than actually doing anything about the problem". Second, the rebound effect, refers to someone who has adopted a pro-environmental behaviour, and as a result feels he/she does not have to adopt additional actions and could possibly even increase his/her anti-environmental behaviours as he/she thinks he/she is pro-environmental in other ways (Gifford, 2011). The net effect of this, which is often negative, can be attributed to an averaging process whereby the

average of the pro-environmental and anti-environmental behaviours are calculated instead of the sum of their impact (Holmgren, Andersson, & Sörqvist, 2018).

In sum, there are various psychological processes that can act as barriers to climate change mitigative and adaptive behaviours. These processes interfere with the various situational, social, and psychological determinants that predict pro-environmental behaviour. The accurate prediction of pro-environmental behaviour therefore requires an understanding of the processes that restrict the positive determinants of behaviour. However, as previously noted, the positive determinants of pro-environmental behaviour vary depending on the specific behaviour in question. Similarly, it can be expected that the psychological barriers that limit pro-environmental behaviours are also behaviour specific. As a result, it is important to determine which psychological barriers limit climate-friendly food choices.

Psychological barriers that limit climate-friendly food choices

To examine the psychological barriers that limit climate-friendly food choice intentions (e.g. a participant's intention to engage in climate-friendly food choices within the next month) and to develop a scale that measures the main barriers associated with climate-friendly food choice intentions, Gifford and Chen (2017) based their analysis on the psychological barriers suggested by Gifford (2011) (discussed above). The barriers were most meaningfully reduced to a four-factor model, containing the following four barrier categories: conflicting goals and aspirations, denial, interpersonal influence, and tokenism.

Conflicting goals and aspirations refer to investments that are at odds with mitigative behaviour (Gifford & Chen, 2017). A person might fear that they will lose an investment of time or money should they change their behaviour and therefore may be

reluctant to do so. *Denial* refers to a general mistrust in the occurrence of climate change or that people can reduce climate change by adopting mitigative behaviours (Gifford & Chen, 2017). Such scepticism about the necessity to adopt mitigative behaviour could reduce an individual's willingness to do so. *Interpersonal influence* refers to social pressures that often compel people to act in a certain way (Gifford & Chen, 2017). If these pressures contradict mitigative behaviour, this could deter them from adopting the behaviour. Last, *tokenism* refers to behaviours that have already been adopted that prevent additional, more impactful behaviours (Gifford & Chen, 2017). For example, an individual who recycles might regard any additional mitigative behaviour as unnecessary, regardless of its impact.

The current study focussed on these four psychological barriers to climate-friendly food choices in a South African context.

Chapter 4: Method

Statement of the research problem

It is imperative, given the impact of climate change that is evident across the globe, to develop an understanding of the constraints associated with mitigating climate change. However, most studies in South Africa have focussed on the biophysical, financial and knowledge barriers experienced in agricultural production and rural development (Shackleton, Ziervogel, Sallu, Gill, & Tschakert, 2015) whilst largely ignoring the psychological processes that limit climate change mitigative behaviour. Though international research has sought to address this issue, research pertaining to the South African context is limited. It is conceivable that the barriers, as experienced by individuals residing in South Africa, differ from those individuals living elsewhere in the world. Such cultural differences occur because perceptions, knowledge, experiences, and socialisation practices differ from culture to culture. These experiences are, in part, influenced by cultural processes, media messages and depictions of climate change, and formal and informal discourses about climate change (American Psychological Association Task Force on the Interface Between Psychology and Global Climate Change, 2010). An understanding of the psychological barriers that inhibit climate-friendly food choices in the South African population is therefore both necessary and essential. Such knowledge will facilitate the development of successful climate change intervention strategies relevant to the South African context.

Research purpose

The primary aim of this study was to explore the extent to which the identified psychological barriers (i.e. denial, conflicting goals and aspirations, tokenism, and interpersonal influence) prevented individuals from making climate-friendly food choices in a South African context. In addition, the study also investigated whether there were

significant differences between males and females, and between different age groups, with regards to the intensity with which they experienced these psychological barriers as well as how often food choices were made with the intention to mitigate climate change. By exploring this, the study can contribute towards the development and enhancement of interventions aimed at addressing this important issue.

Research questions

Question 1: What is the influence of denial, tokenism, interpersonal influence, and conflicting goals and aspirations on climate-friendly food choices?

Question 2: Is an increase in the intensity with which the psychological barriers are experienced associated with a reduction in climate-friendly food choices?

Question 3: Is there a significant difference between males and females with regards to the extent to which they experience psychological barriers to climate-friendly food choices?

Question 4: Is there a significant difference between males and females with regards to how often they make climate-friendly food choices?

Question 5: Is there a significant difference between different age groups with regards to the extent to which they experience psychological barriers to climate-friendly food choices?

Question 6: Is there a significant difference between different age groups with regards to how often they make climate-friendly food choices?

Research design

To achieve the aims of this research, this study followed a survey design. A survey design provides quantitative data on attitudes, trends or characteristics of a population by investigating a sample from that population (Creswell, 2013). The study was cross-sectional in nature. That is, data of each participant were collected once, and data collection took place over a short period of time. Data were collected by means of an online questionnaire. This method made it possible to reach a large group of people in a short period of time. Also, it provided participants the opportunity to answer the survey in privacy and in a time that was convenient for them. Instructions were clear and concise, and the survey was designed such that all questions had to be answered in order to complete the survey. The use of an online survey development service, which was relatively inexpensive, allowed for easy access to the data, and easy extraction of the data into Excel.

Sampling

Target population

The study focussed on the influence that the psychological barriers, which were identified by Gifford and Chen (2017), had on climate-friendly food choices in a South African context. South Africa is a country on the southern tip of the African continent, with a population of 56.52 million residents (Office for National Statistics, 2017). There are nine provinces within South Africa of which Gauteng comprises the largest share of the South African population (25%), with a total population of 14.3 million people (Office for National Statistics, 2017). Two of the nation's largest cities, namely Johannesburg and Pretoria are located in Gauteng. An estimated 51% of the South African population is female, and 49% is male (Statistics South Africa, 2017). The present study focussed on adults (18 years or older) who currently reside in Gauteng.

Sampling procedure

The sample was drawn from a population of adults, male and female, residing in Gauteng, who had access to the Internet. Gauteng has an Internet penetration of 55% (World Wide Works & Dark Fibre Africa, 2017), that is every second person has access to the Internet. The initial sample was obtained via convenience sampling. I invited participants to the study, using Facebook as a sampling frame. Facebook, which allows people to build online social networks and connects millions of people daily, is rated the top ranking social networking site in the world (The Nielsen Company, 2017). In 2016, Facebook reportedly had 14 million active users in South Africa (Blue Magnet, 2016). The number of active social networking users in South Africa increased by 15% from January 2016 to January 2017 (We Are Social & Hootsuite, 2017). Considering Facebook's high penetration in South Africa, this platform was regarded as a relatively fast and cost-effective way to reach a large group of people. Participants were requested to invite three friends to participate in the study. Thus, the balance of the participants was accessed by means of referral or snowball sampling (a sampling technique in which one participant refers the researcher to another potential participant and so forth until the entire desired sample size has been reached). Convenience and referral sampling are both examples of non-probability sampling techniques. That is, participants are not randomly selected from the population. These techniques, which are vulnerable to sampling bias, because of subject self-selection, could result in certain groups of the population being excluded from, or underrepresented in, the study. As a result, the representativeness of the sample cannot be assumed, and the results cannot be generalised to the entire population.

Sample size

It is imperative to obtain a sufficient sample size as this directly influences the power of the results (Cohen, 1988). Statistical power is a function of the following three

variables: Sample size (n), significance criterion (α), and effect size (ES). Statistical power can be explained as the likelihood that a study will observe a phenomenon when there is a phenomenon to be observed and is conventionally set to .80 (Cohen, 1992). The larger the sample size the larger the power of the study. Significance can be described as the probability of obtaining a result by chance alone and is usually set to .05 or .01. Therefore, should a result be significant at the .05 level, that means there is a 5% or less chance that the result occurred by chance only. At the lower level (e.g. $p < .01$) should a result be significant, there is only a 1% or less possibility that the result was obtained by chance. ES is the degree to which the phenomenon being studied is present in the population (Cohen, 1988). In other words, ES is the practical significance of a phenomenon. Therefore, the larger the ES the smaller the sample size that is needed to observe the phenomenon in the population. The ES indexes differ depending on the statistical test used and can be interpreted, based on Cohen's (1992) guides, as either small, medium, or large. In sum, it is imperative to obtain a sample that is large enough to detect a phenomenon should it exist in a population. However, it is suggested that the required samples size be determined prior to undertaking the study. A discussion on how the required sample size was calculated follows below.

As a general rule of thumb, when examining relationships between variables (e.g. correlation and regression analysis), there should be no less than 50 participants (Vanvoorhis & Morgan, 2007). This number should increase with larger numbers of independent variables. For a multiple linear regression analysis with four independent variables, given a medium effect size, the desired sample size is 84 participants to achieve a power of .80 (alpha = .05) (Vanvoorhis & Morgan, 2007). For statistical techniques that detect differences between means (e.g. t-test and ANOVA), given a medium to large effect size, a sample size of 30 respondents per group is necessary to achieve power of .80 (alpha

= .05) (Cohen, 1988). A sample size of 90 respondents was therefore considered sufficient to detect differences between groups with a medium to large ES. It was, however, not possible to know with certainty what the ESs would be prior to conducting the analysis and therefore an estimate was used for priori power analysis. Post-hoc power analysis was conducted to determine the actual ES and power per analysis and is reported in Chapter Five.

Participants

A total number of 167 individuals proceeded to the survey, of which 151 completed the survey. Questionnaires with incomplete responses were not included in the analysis. Six respondents reported that they lived in a province other than Gauteng at the time of the survey, and they were consequently not included in the analysis. All respondents declared that they were older than 18 years at the time of the study. The final sample consisted of 146 respondents. A description of the sample obtained in this study is provided next.

Age.

Age was captured in years (year of birth) and then categorised into three groups that resemble three generations; Millennials, Generation X, and Baby Boomers. Their answers were compared to ascertain if there were any significant differences with regards to (1) the extent to which they experienced psychological barriers to climate-friendly food choices and (2) how often they made climate-friendly food choices to answer research questions five and six. Generations encounter different historical and social influences and it is therefore reasonable to assume that they also vary in terms of their pro-environmental behaviour. There is little agreement about where different generations start and end and the labels attached to them (for a review see Smola & Sutton, 2002). In this study the generations were accepted as: Millennials born after 1982, Generation X born from 1966

to 1982, and Baby Boomers born from 1940 to 1965 (Dutzik, Inglis, & Baxandall, 2014; Jonck, Van der Walt, & Sobayeni, 2017; Smola & Sutton, 2002). One participant was born in 1938 and was included in the Baby Boomers group. The participants' mean age was 38.94 years (SD = 11.59, range 23 – 80). Just under half of the participants were Millennials (49.3%, n = 72), 39% were Generation X (n = 57), and 11.6% were Baby Boomers (n = 17).

The effect of age on pro-environmental behaviour is inconclusive. Past research has indicated a decrease in food waste with age (Secondi, Principato, & Laureti, 2015). Similarly, individuals between the ages of 56 and 65 years were more concerned about environmental friendliness when making food choices than individuals between the ages of 18 and 30 years (Hartikainen et al., 2014). Pohjolainen et al. (2015) also found young age to be a factor in strengthening the barrier perception to following a plant-based diet. In contrast with these findings, Wang's et al. (2014) results indicated a negative correlation between age and pro-environmental behavioural intention, environmental value, environmental sensitivity, and environmental knowledge.

Gender.

Gender was captured as a categorical variable (Female=1, Male=2) to answer research questions three (Is there a significant difference between males and females with regards to the extent to which they experience psychological barriers to climate-friendly food choices?) and four (Is there a significant difference between males and females with regards to how often they make climate-friendly food choices?). The data revealed that 51.4% of the sample were female (n = 75) and 48.6% of the sample were male (n = 71). This is in line with the population estimates for gender (discussed earlier).

Past research has indicated that females are more conscious of their food waste than males and that they waste less food as per self-estimated waste percentage (Secondi et al., 2015). In a survey conducted in Finland, in which participants were asked to rate the importance of different attributes when making food choices, females scored environmental friendliness higher than males (Hartikainen et al., 2014). The impact of gender on willingness to buy local food as a climate change mitigative action was significant in an American sample, with females being more willing to do so. This was, however, not found in a Dutch sample (de Boer et al., 2016). Research by Siegrist, Visschers, and Hartmann (2015) also indicated that females and higher-educated individuals perceived a reduction in meat consumption as more beneficial to the environment when compared with males and less-educated individuals. However, in a study conducted in rural China, women were less involved in sustainable consumption behaviours and less concerned about the environment. On the contrary, unmarried, wealthy, and well educated men showed higher levels of sustainable consumption behaviours (Wang et al., 2014). Hence, the effect of gender on pro-environmental behaviour requires further investigation.

Province of residence.

Province of residence was determined by listing all nine provinces in South Africa. Participants were asked to confirm in which province they lived at the time of the study. One of the inclusion requirements of the study was that respondents lived in Gauteng. By allowing respondents to choose any of the nine provinces, I could identify which respondents' data should not be included in the analysis. A total of six respondents who completed the survey were not residents of Gauteng and were excluded from the study.

Relationship status.

Relationship status was determined by the following question: “Which of the following best describes your current relationship status?”. A respondent could choose one of the following options: Married, widowed, divorced, separated, in a domestic partnership or civil union, single but cohabitating with a significant other, and single - never married. Just under half of the participants were married (47.9%, n = 70). A total of 26.7% (n = 39) were single - never married, and 15.8% were single, but cohabitating with a significant other. Frequencies and percentages are reported in Table 1 (below).

Table 1

Relationship Status

Relationship Status	Frequency	Percent
Married	70	47.9
Divorced	8	5.5
Separated	1	.7
Domestic / civil union	5	3.4
Single, cohabitating	23	15.8
Single, never married	39	26.7
Total	146	100.0

Level of education.

A respondent’s level of completed education was determined by the following question: “What is the highest degree or level of school you have completed? (If you’re currently enrolled in school, please indicate the highest degree you have received)”. Respondents were able to choose one of the following options: Less than a high school degree, High school degree or equivalent, Higher certificate, Diploma & Advanced

certificate, Bachelor's degree & Advanced diploma, Honours degree & Postgraduate diploma, Master's degree, and Doctoral degree. Approximately a third of the participants indicated that they had obtained a BA degree or an advanced certificate (28.1 %, n = 41). A total of 24% (n = 35) had obtained an honours degree or a postgraduate diploma, and 18.5 % had a master's degree. Frequencies and percentages are reported in Table 2 (below).

Table 2

Education

Level of Education	Frequency	Percent
Less than high school	2	1.4
High school	13	8.9
Higher certificate	8	5.5
Diploma / advanced certificate	20	13.7
BA / advanced certificate	41	28.1
Honours / postgraduate diploma	35	24.0
Masters	27	18.5
Total	146	100.0

Household income.

Respondents' household income per year was determined by the following question: "What is your approximate average household income per year?". Respondents were able to choose one of the following options: R0 – R11 600, R11 601 – R49 000, R49 001 – R109 000, R109 001 – R234 000, R234 001 – R378 000, R378 001 – R783 000, R783 001 – R1 693 000, and R1 693 001+. A third of the participants indicated a household income between R378,001 and R783,000 per year (31.5%, n = 46); 2.1% of

the sample earned below 11,601 per year per household (n = 3), and 6.8% earned R1,693,001 or more per year per household (n = 10). Frequencies and percentages are reported in Table 3 (below).

Table 3

Household income per year

Household Income (Rand)	Frequency	Percent
0 - 11,600	3	2.1
11,601 - 49,000	6	4.1
49,001 - 109,000	5	3.4
109,001 - 234,000	14	9.6
234,001 - 378,000	22	15.1
378,001 - 783,000	46	31.5
783,001 - 1,693,000	40	27.4
1,693,001 +	10	6.8
Total	146	100.0

Data collection

Data were collected by means of an online questionnaire that was accessible from 15 January 2018 to 10 March 2018, after which the survey was closed.

The questionnaire was in English (one of the 11 official languages spoken in South Africa). All the questions, except year of birth, were closed-ended. Types of questions included multiple choice questions and rating scales.

Data collection procedure

Invitations to partake in the study were sent to my Facebook contact list, using the Facebook Messenger Inbox Service. The invitation was also posted on the group thread of a Facebook group for postgraduate psychology students. The invitation provided a short introduction to the study. In the event that an individual was interested in the study, he/she could follow a link to an external website. I created a website, using Wix.com, a cloud-based web development platform. The external website contained details about the study, me (the researcher), the inclusion requirements, and consent details. At this stage, if individuals were interested in completing the survey, they could proceed to the survey by clicking on the 'continue to survey' button that was placed at the bottom of the landing page. Should an individual click on the 'continue to survey' button, they were directed to the online survey that was placed on Survey Monkey (an online survey development service). The prospective participants were informed that by clicking to continue to the survey they provided consent to take part in the research.

Prospective participants were requested to invite three friends to take part in the study. The request to invite friends was placed on the external website and participants were reminded of the request at the end of the survey. The invitation could be shared by either sending the invitation that was received or by sharing the link to the external website, using various communication platforms (e.g. Facebook, WhatsApp, Email, or Short Message Service (SMS)), and thus extended the sampling frame to all individuals with Internet access and not only individuals who were active on Facebook.

Measuring instruments

Climate-friendly Food Choices Scale.

The Climate-friendly Food Choices Scale was used to measure the dependent variable in the study, namely climate-friendly food choices. Climate-friendly food choices

can be defined as food choices that are made with the intention to mitigate climate change. The scale consisted of six items that measured how often participants made specific food-related choices with the intention to mitigate climate change. Statements such as "I favour local food" and "I limit the consumption of meat and dairy products" were measured on a 7-point Likert scale (1=never, 2=less than once a year, 3=once or a few times a year, 4=once or a few times during six months, 5=once or a few times a month, 6=once or a few times a week, and 7=almost daily or daily). One continuous climate-friendly food choice score, between 6 and 42 was calculated per participant. A high score indicated that participants more often made food choices with the intention to mitigate climate change than those with a low score. Mäkiniemi and Vainio, (2013) reported a reliability coefficient of .90 for the scale. (See Appendix A for questionnaire.)

Psychological Barriers Scale.

Permission was obtained from the authors, Dr Robert Gifford and Angel Chen, to use the Psychological Barriers Scale for this research project. Psychological barriers can be defined as psychological processes that prevent or limit certain behaviours, in the current study specifically climate-friendly food choices. To examine the psychological barriers that limit climate-friendly food choice intentions, Gifford and Chen (2017) based their scale on the psychological barriers suggested by Gifford (2011). Their analysis included 36 barrier items adjusted to fit the food context. In addition to establishing whether a relationship existed between the barriers, as suggested by Gifford (2011), and climate-friendly food choice intentions, Gifford and Chen (2017) were also interested in reducing the possibly related items to more meaningful dimensions. To this end, a principal component analysis, with parallel analysis and Velicer's minimum average partial test was performed. Three, four, and five factor solutions were examined. Items that loaded below 0.5 and that appeared low in construct validity were deleted. The barrier items most

meaningfully loaded on a four-factor solution. Based on the items within each factor they were named as follows: denial, conflicting goals and aspirations, tokenism, and interpersonal influence. The first factor (denial) explained 36% of the variance, followed by 6% (conflicting goals and aspirations), 4% (tokenism), and 3% (interpersonal influence). Hence, cumulatively the four-factor model explained 49% of the variance. The authors reported Cronbach reliability coefficients for each factor as follows; denial .89, conflicting goals and aspirations .82, tokenism .74 and interpersonal influence .66 (Gifford & Chen, 2017).

In this study, the Psychological Barriers Scale was used to measure the effects of the independent variable on the dependent variable (i.e. climate-friendly food choices). The scale was divided into four psychological barrier categories namely: denial, conflicting goals and aspirations, tokenism, and interpersonal influence. The scale consisted of a total of 17 barrier statements, each statement representing one of the four barrier categories. Barrier statements included statements such as “Humankind cannot make a difference when it comes to saving the earth, so there is no point for me to change” and “I’m satisfied with my current way of doing things”. Participants were asked to rate the extent to which their climate-friendly food choices were limited. The scale consisted of 5-point Likert scale items (1= “strongly disagree” to 5= “strongly agree”). A composite, continuous barrier score, which was calculated, reflected a participant’s overall psychological barrier score, as well as a continuous score per barrier category. The possible range of scores is between 17 and 85 for the overall barrier score; between 5 and 25 for denial, conflicting goals and aspirations, and tokenism, and between 2 and 10 for interpersonal influence. None of the items were reversed scored. Respondents with a high score experienced the psychological barrier more strongly than those with a low score. The

authors did not provide any additional interpretation for the scale. (See Appendix A for the questionnaire.)

Biographical questionnaire.

Six biographical questions (relating to participants' gender, age, province of residence, relationship status, level of education, and household income) were included in the survey to enable the researcher to answer research questions three (Is there a significant difference between males and females with regards to the extent to which they experience psychological barriers to climate-friendly food choices?), four (Is there a significant difference between males and females with regards to how often they make climate-friendly food choices?), five (Is there a significant difference between different age groups with regards to the extent to which they experience psychological barriers to climate-friendly food choices?), and six (Is there a significant difference between different age groups with regards to how often they make climate-friendly food choices?).

Data analysis

Data capturing

The data were captured using an online survey development cloud-based software service, named Survey Monkey and exported into Microsoft Excel. Data for participants, who did not fulfil the inclusion criteria (i.e. residing in Gauteng and 18 years or older) and for individuals who did not complete the survey, were removed from the data set. Each participant was assigned an identification number (i.e. Subject ID). The data set was then imported into the Statistical Package for the Social Sciences (SPSS, version 25).

Analytical techniques

The following analyses were used to examine the data.

Multiple linear regression analysis.

This test was performed to determine the influence of denial, tokenism, interpersonal influence, and conflicting goals and aspirations on climate-friendly food choices. The following research question, using this technique, was tested:

Question 1: What is the influence of denial, tokenism, interpersonal influence, and conflicting goals and aspirations on climate-friendly food choices?

Multiple linear regression analysis is used to determine whether an outcome can be predicted based on the values of two or more predictor variables (Berry, 1993; Cohen, Cohen, West, & Aiken, 2003; Laerd Statistics, 2015e). The overall fit of a model and the relative contribution of each predictor variable to the model is also established. In order to perform this analysis, the outcome variable (i.e. the dependent variable) should be continuous, with two or more predictor variables (i.e. independent variables) that are either categorical or continuous, and there should be independence of observations (i.e. the value of one observation does not affect or influence the value of another observation). Significant outliers in the data could influence the regression line of the model and the data should therefore be assessed for any outliers. Multiple linear regression analysis relies on the initial assumption that a linear relationship exists between each predictor variable and the outcome variable, as well as between the composite predictor variable and the outcome variable. In addition to this, the data should show homoscedasticity of residuals (errors) and the residuals should be approximately normally distributed. In other words, the amount of error should remain consistent across the full range of the observations. This means that the predictive value of each predictor variable will remain constant across the full range of the outcome variable. There should be no multicollinearity. The reason being that, the model aims to predict the relative contribution of each predictor variable,

however, if the variables are highly related, it is not possible to distinguish which variable is responsible for the outcome.

Spearman's rank-order correlation.

This analysis technique was used to investigate the relationship between the level of psychological barriers experienced and how often the participants made climate-friendly food choices. The following research question, using this technique, was tested:

Question 2: Is an increase in the intensity with which the psychological barriers are experienced associated with a reduction in climate-friendly food choices?

Spearman's rank-order correlation test is used to determine the strength and direction of a relationship between two continuous or ordinal variables that are paired (i.e. a participant has a score for each variable) (Laerd Statistics, 2018; Lehmann, 2006). This technique is often used as a non-parametric alternative if the assumptions of the Pearson's product-moment correlation have been violated. Pearson's correlation coefficient was not used as the data violated the assumption of normality. To perform the analysis, a monotonic relationship, which can be assessed by visual inspection of a scatterplot, should exist between the two variables. Any significant outliers could influence the correlation coefficient. Therefore, it is important to determine whether there are any outliers in the data and to establish their influence on the relationship.

Mann-Whitney U test.

This technique was used to determine whether there was a significant difference between males and females with regards to the intensity with which they experienced psychological barriers to climate-friendly food choices. The following research question, using this technique, was tested:

Question 3: Is there a significant difference between males and females with regards to the extent to which they experience psychological barriers to climate-friendly food choices?

The Mann-Whitney U test is a rank-based non-parametric test that is used to determine whether there is a significant difference between two independent groups, that are categorical in nature, on one continuous, dependent variable (Laerd Statistics, 2015d; Lehmann, 2006). This test can be used as a non-parametric alternative to the Independent-samples t-test if the data violate the assumptions of the independent-samples t-test. The Independent-samples t-test was not performed as the data were not normally distributed for both groups of the independent variable. Test requirements of the Mann-Whitney U test include independence of observations. In addition, it is important to determine whether the distribution of scores for both groups of the independent variable have the same, or a different, shape, as this will influence how the test results are interpreted. The data were assessed for outliers.

Independent-samples t-test.

This analysis was performed to establish whether a significant difference existed between males and females with regards to how often they made climate-friendly food choices. The following research question, using this technique, was tested:

Question 4: Is there a significant difference between males and females with regards to how often they make climate-friendly food choices?

The Independent-samples t-test is a two-group univariate analysis (Laerd Statistics, 2015b). This technique is used to determine whether a significant difference exists between the means of two independent groups that are categorical in nature, on one continuous, dependent variable. There should also be independence of observations. It is

important to establish whether there are significant outliers in the two groups of the independent variable in terms of the dependent variable, as they can have a significant impact on the mean and standard deviation of a group. In order to perform this test, it is important that the dependent variable is normally distributed for both groups, and that there is homogeneity of variances for the dependent variable for both groups.

The Kruskal-Wallis H test.

This technique was used to determine whether the different age groups were significantly different from each other with regards to the severity with which they experienced the psychological barriers to climate-friendly food choices. The following research question, using this technique, was tested:

Question 5: Is there a significant difference between different age groups with regards to the extent to which they experience psychological barriers to climate-friendly food choices?

The Kruskal-Wallis H test is a rank-based non-parametric test that can be used to determine whether there are statistically significant differences between two or more categorical, independent groups on a continuous or ordinal variable (Kruskal & Wallis, 1952; Laerd Statistics, 2015c). A post-hoc test is necessary to establish where the difference lies. This test can be used as the non-parametric alternative to the one-way ANOVA when the data fails the assumptions of the one-way ANOVA. The one-way ANOVA was not performed as the data violated the assumption of normality. Test requirements of the Kruskal-Wallis H test include independence of observations and it is important to determine whether the distributions in each group have the same shape, as this will influence how the test results are interpreted. The data were assessed for outliers.

The one-way analysis of variance (ANOVA).

This test was used to determine whether there was a significant difference between the different age groups with regards to how often they made climate-friendly food choices. The following research question, using this technique, was tested:

Question 6: Is there a significant difference between different age groups with regards to how often they make climate-friendly food choices?

The one-way ANOVA is used to determine whether a statistically significant difference exists between the means of two or more independent, categorical groups on one dependent, continuous variable (Laerd Statistics, 2017). There should be independence of observations. The data were assessed for outliers. In order to perform the test, there should be an approximately normal distribution of the dependent variable for each group of the independent variable, and there should be homogeneity of variances.

Data assumptions

Outliers.

Outliers are unusual data points that have an exceptional effect on the data (Kwak & Kim, 2017). Due to the negative impact this could have on the outcome of the analysis, outliers should be identified and monitored. Outliers can be detected in different ways, for example, by visual inspection of a boxplot or a scatterplot. Outliers can also be dealt with in various ways. Should an outlier be the result of an error in the data (e.g. typing mistake) then it can simply be removed from the data. However, if there are no errors in the data, removing an outlier is a contentious issue as it is possibly the true representation of a participant in the study. It is then up to the researcher to decide whether the outlier should be removed or not. In the present study, outliers that were not a result of errors, were dealt with as follows. First, the analysis was run with the outliers in the data. Then, the outliers

were removed from the data and the analysis was carried out again. The results from both the analyses were then compared to determine whether the outlier(s) had a significant impact on the outcome. It was concluded that the outliers were not significantly influential and they were kept in the data.

Linearity.

A linear relationship between two variables implies that the value of one variable increases or decreases proportionally in relation to the other variable (Osborne & Waters, 2001). To establish whether a linear relationship exists, a scatterplot can be used. If the variables are linearly related, the data points on the plot will follow an approximately straight line.

Homoscedasticity.

Homoscedasticity or homogeneity of variances is an assumption of equal variance (Osborne & Waters, 2001). In regression analysis techniques this assumption is usually referred to as homoscedasticity and can be assessed by creating a scatterplot of studentised residuals against unstandardised predicted values. The assumption is met if the spread of the variances remains constant. When conducting an Independent-samples t-test or a one-way ANOVA, this assumption is usually referred to as homogeneity of variances and requires the population variances for each group of an independent variable to be equal (Laerd Statistics, 2015b). This assumption is tested by using Levene's test of equality of variances, which tests the null hypothesis that the population variances are equal. If Levene's test is statistically significant (i.e. $p < .05$), then the assumption has been violated.

Normality.

Normality implies that scores are approximately normally distributed. For example, when conducting an Independent-samples t-test, the assumption of normality implies that the dependent variable is approximately normally distributed for each group of the independent variable. A z-test is applied for normality analysis, using skewness and kurtosis values (Kim, 2013; Osborne & Waters, 2001). Skewness indicates asymmetry and kurtosis indicates the sharpness of the peak. The critical z-value is adjusted depending on the sample size. The critical value for rejecting the assumption of normality increases with sample size. The following guide was used: For a sample size of less than 50 cases, a critical z-value of more than 1.96 ($p < .05$), and a sample size of more than 50 and less than 300, with a critical value of more than 3.29 ($p < .05$) would lead to the conclusion that the data are non-normally distributed.

Multicollinearity.

Multicollinearity refers to the inter-associations amongst independent variables that could cause a disturbance in the outcome of a test (Hair, Black, Babin, & Anderson, 2014; Laerd Statistics, 2015e). For example, when conducting a multiple linear regression analysis, if the predictor variables are highly correlated with each other, it will not be possible to determine the actual predictive value of a specific predictor variable. Multicollinearity can be assessed by inspecting correlation coefficients and Tolerance values. Independent variables should not have correlations greater than .07 and Tolerance values should be above .1.

Validity and reliability

The construct validity of a test refers to how accurately it measures what it is supposed to measure (Creswell, 2013). The construct validity for the Psychological

Barriers Scale is discussed under measuring instruments (above) and is reported in Gifford and Chen (2017).

Reliability refers to the overall consistency of an instrument. An instrument with internal reliability produces similar results under the same conditions across time. Cronbach's Alpha (α) is a measure of internal reliability (Cronbach, 1951; Kline, 2011; Laerd Statistics, 2015a). As a rule of thumb, Cronbach's α can be interpreted as follows: $\alpha \geq .9$ is excellent, $.8 \leq \alpha > .9$ is good, $\leq .7\ \alpha > .8$ is acceptable, $.6 \leq \alpha > .7$ is questionable, $.5 \leq \alpha > .6$ is poor, and $\alpha < .5$ is unacceptable. To determine the internal reliability of the measurements used in this study, Cronbach's α was calculated in SPSS for each measurement based on the present sample. The composite Psychological Barriers Scale had an α value of .825, and the α values for the four factors were as follows; conflicting goals and aspirations was .734, denial was .829, tokenism was .699, and interpersonal influence was .533. The Climate-Friendly Food Choices Scale had an α of .703.

The survey measured self-reported behaviours and opinions. This could pose a threat to the validity of the study, as participants could respond to questions in a socially desirable manner. In other words, they could experience pressure to respond to questions in a way that would be acceptable to society. However, respondents typically provide honest answers about their behaviour, provided that: One, there is no strong social desirability or sensitivity that exists around the topic, two, there is little involvement from the researcher (e.g. self-administered questionnaires as in the present study), and three, the questionnaire is anonymous and confidentiality is provided (Krumpal, 2013). As far as I am aware, no strong social desirability exists about the topic. Participation in the study was also anonymous, and all data obtained was treated as confidential (and communicated as such to the participants prior to taking the survey), and the survey could be completed in

private, without the interference of the researcher. Therefore, it was unlikely that respondents would respond to the questions in a socially desirable manner.

Ethical Considerations

In line with the moral principles of autonomy, justice, non-maleficence, and beneficence, this study ensured ethical practice by implementing the following measures. Each potential participant received an invitation to take part in the study. The invitation included information about me (the researcher), a description of the study, and information about the University of South Africa's Ethics Policy. Anonymity and confidentiality were discussed in the consent letter (see Appendix C for consent letter). The potential participant was informed that by clicking on the survey link he/she consented to take part in the study and was assured that he/she was free to withdraw from the study at any point before submitting the survey. A link at the bottom of the invitation directed the potential participant to an external web-based survey. At no time was any potential participant under any obligation to agree to take part in the study. Anonymity was ensured by not capturing any information about the participant that would make them identifiable and by discussing results as a collective and not on an individual basis. The collected data were exported from Survey Monkey after conclusion of the survey and were stored on a password protected home computer, to which only I had access. The data will be kept for a minimum of five years for auditing purposes. Groups of the population that were excluded or underrepresented in the study was discussed as a suggestion for future research. There were, however, no anticipated risks for any group of the population should they have been excluded or underrepresented in the study. There were also no foreseeable risks for the participants of the study. Participants could have experienced slight inconvenience due to the time it took to complete the survey. However, participation in the study was voluntary, the survey took no more than 10 minutes to complete, and participants were able to

complete the survey at their own convenience. The research report will be accessible to the public and the academic community.

Chapter 5: Results

The primary aim of this study was to explore the extent to which the four psychological barriers, as suggested by Gifford and Chen (2017), prevent individuals from making climate-friendly food choices in a South African context. Furthermore, the study assessed the relationship between psychological barriers and climate-friendly food choices, and whether there were significant differences between males and females, and between different age groups, with regards to the intensity with which they experienced psychological barriers to climate-friendly food choices and how often food choices are made with the intention to mitigate climate-change. The study followed a quantitative, survey design to measure participants' psychological barriers that limit climate-friendly food choices and how often they make climate-friendly food choices. This chapter contains the research findings.

Descriptive statistics

Participants reported, on average, low levels of psychological barriers (M = 2.119, SD = 0.523) on a 5-point Likert scale. Of the 17 barrier statements, the strongest barrier was that participants were satisfied with their current way of doing things (M = 3.27, SD = 1.060), which was a measure of Tokenism. The mean climate-friendly food choices score indicated that on average, on a 7-point Likert scale, participants made climate-friendly food choices between at least once during 6 months to at least once per month (M = 4.651, SD = 1.218). Participants tried to limit food waste (M = 6.23, SD = 1.448), favoured local food (M = 5.75, SD = 1.499), and chose to eat seasonal food (M = 5.60, SD = 1.412), but were less likely to avoid the use of imported food products (M = 3.53, SD = 2.419), limit their consumption of meat and dairy products (M = 3.42, SD = 2.316), and select foods on the basis of its climate impact (M = 3.38, SD = 2.144).

Question 1: What is the influence of denial, tokenism, interpersonal influence, and conflicting goals and aspirations on climate-friendly food choices?

A multiple linear regression analysis was conducted to predict climate-friendly food choices from denial, tokenism, interpersonal influence, and conflicting goals and aspirations. There were no significant outliers in the data, as assessed by inspecting studentised deleted residuals. All residuals were below ± 3 standard deviations. One risky leverage point (LEV value of 0.23, Subject ID: 8) was detected, however as a rule of thumb a leverage value between 0.2 to less than 0.5 is acceptable (Laerd Statistics, 2015e). Upon investigation of Cook's Distance values, there were no values above 1. A Cook's value above 1 requires investigation (Cook & Weisberg, 1982), hence there were no highly influential points. Preliminary assumption testing indicated that the independent variables were collectively linearly related to the dependent variable. This was assessed by a plot of studentised residuals against unstandardised predicted values (see Figure 1 in Appendix B). The residuals formed a horizontal band on the plot, which indicated that the relationship between the dependent variable and the independent variables collectively was likely to be linear. Each independent variable was also linearly related to the dependent variable. This was assessed by visual inspection of partial regression plots for each independent variable and the dependent variable (See Figures 2-5 in Appendix B) and scatterplots (see Figures 6 – 9 in Appendix B). An approximately straight line indicated that the variables were linearly related. To determine whether the residuals were equal for all values of the dependent variable (i.e. homoscedasticity), the plot of studentised residuals against unstandardised predicted values (see Figure 1 in Appendix B) was assessed. The spread of the residuals was approximately constant, indicating that there was homoscedasticity. Residuals were approximately normally distributed, as assessed by visual inspection of a histogram with a superimposed normal curve (see Figure 10 in

Appendix B) and a P-P plot (see Figure 11 in Appendix B). The mean and standard deviation were approximately 0 and 1 respectively, and the data points on the P-P plot were aligned along the diagonal line, thus suggesting that the residuals were normally distributed. The independent variables were not highly correlated with each other (i.e. multicollinearity), as assessed by inspection of correlation coefficients and tolerance values. The correlations between the independent variables were all below .07 and tolerance values were greater than .1.

Results indicated that the model explained 10.6 % of the variance in climate-friendly food choices, $R^2 = .130$, adjusted $R^2 = .106$, F (4, 141) = 5.284, $p = .001$. The effect size, based on Cohen's (1992) index was medium ($f^2 = .12$) and the test had a power of .92. According to Cohen's (1992) index an f^2 value, as a measure of effect size, of .02 is small, .15 is medium, and .35 is large. Denial significantly predicted climate-friendly food choices (β = -.224, $p = .014$), as did conflicting goals and aspirations (β = -.292, $p = .001$), and interpersonal influence (β = .198, $p = .031$). Tokenism did not significantly predict climate-friendly food choices (β = .072, $p = .395$). Regression coefficients and standard errors are reported in Table 4 (below).

Table 4

Regression Coefficients and Standard Errors of the Multiple Regression Analysis

	Unstandardized Coefficients		Standardized Coefficients	Test statistic	Probability value
	B	SE B	β	*t*	*p*
Denial	-.444	.179	-.224	-2.484	.014*
Conflicting Goals	-.576	.175	-.292	-3.294	.001*
Tokenism	.145	.170	.072	.852	.395
Interpersonal Influence	.976	.448	.198	2.179	.031*

Note. * $p < .05$

Question 2: Is an increase in the intensity with which the psychological barriers are experienced associated with a reduction in climate-friendly food choices?

A Spearman's correlation analysis was conducted to assess the relationship between psychological barriers and climate-friendly food choices. One outlier was detected in the data (Subject ID: 8), by visual inspection of a scatterplot (see Figure 12 in Appendix B). To assess the influence of the outlier on the result, the analysis was first conducted with the outlier and then without. There was a monotonic relationship between the two variables, as assessed by visual inspection of a scatterplot (see Figure 12 in Appendix B).

The test result, including the outlier was significant at the .01 level (2-tailed) (p = .001). There was a near medium association between the extent to which psychological barriers were experienced and how often food choices were made with the intention to mitigate climate change, (r_s = -.262, N = 146) and power of .80, based on Cohen's (1992) conventions. According to Cohen's (1992) conventions an r value, as a measure of effect size, of .10 is small, .30 is medium, and .50 is large.

The outlier was then removed from the data. The test result, excluding the outlier was significant at the .01 level (2-tailed) (p = .001). There was a near medium association between the extent to which psychological barriers were experienced and how often food choices were made with the intention to mitigate climate change, (r_s = -.266, N = 145) and power of .80, based on Cohen's (1992) conventions.

Question 3: Is there a significant difference between males and females with regards to the extent to which they experience psychological barriers to climate-friendly food choices?

A Mann-Whitney U test was conducted to determine whether males and females differed from each other with regards to the extent they experienced psychological barriers to climate-friendly food choices. Boxplots indicated that there were two outliers in the data (Subject ID: 8 and 86) (see Figure 13 in Appendix B). To determine the effect of the outliers on the data, the analysis was first conducted with, and then without, the outliers. The dependent variable was similarly shaped for both groups of the independent variable, as assessed by visual inspection of a histogram (see Figure 14 in Appendix B).

The difference between median psychological barrier scores for males (Mdn = 36, SD = 9.215) and females (Mdn = 34, SD = 8.535) was statistically insignificant, U = 3019.50, z = 1.399, p = .162. The effect size, based on Cohen's (1992) index was small (d

= .239), with a power of .29. As per Cohen's (1992) index, a *d* value, as a measure of effect size, of .20 is small, .50 is medium, and .80 is large.

The outliers were then removed from the data. The dependent variable was similarly shaped for both groups of the independent variable, as assessed by visual inspection of a histogram (see Figure 15 in Appendix B). The difference between median psychological barrier scores for males (Mdn = 36, SD = 7.242) and females (Mdn = 34, SD = 8.072) was statistically insignificant, $U = 2944.50$, $z = 1.419$, $p = .156$. The effect size, based on Cohen's (1992) indices was small ($d = .232$), with a power of .27.

Question 4: Is there a significant difference between males and females with regards to how often they make climate-friendly food choices?

An independent-samples t-test was conducted to determine if males and females differed significantly with regards to how often they made climate-friendly food choices. There were no outliers detected in the data, as assessed by visual inspection of a boxplot. Preliminary assumption analysis indicated that climate-friendly food choice scores were normally distributed for females with skewness of -0.239 (SE = 0.277) and kurtosis of -0.746 (SE = 0.548) and for males with skewness of -0.176 (SE = 0.285) and kurtosis of -0.430 (SE = 0.563). There was homogeneity of variances for climate-friendly food choice scores for females and males, as assessed by Levene's test for equality of variances ($p = .499$).

Climate-friendly food choice scores for females were 2.185 (SE = 1.201) higher than that of males. For means and standard deviations see Table 5 (below).

Table 5

Mean and Standard Deviation of Climate-friendly food choices per gender

Gender	Mean	Standard Deviation
Female	28.97	7.442
Male	26.79	7.049

The difference was not statistically significant, t (144) = 1.819, p = .071. The effect size, based on Cohen's (1992) index was small (d = .30) at power of 0.44.

Question 5: Is there a significant difference between different age groups with regards to the extent to which they experience psychological barriers to climate-friendly food choices?

The Kruskal-Wallis H test was conducted to determine if there was a statistically significant difference between the different age groups with regards to the extent to which they experienced the psychological barriers. Participants were classified into three age groups: Millennials (n = 72), Generation X (n = 57), and Baby Boomers (n = 17). There were four outliers detected in the data (Subject IDs: 8, 67, 83, and 110) (see Figure 16 in Appendix B). To determine the effect of the outliers on the results, the test was conducted with and without the outliers.

Preliminary assumption analysis, including outliers in the data, indicated that the distributions of the psychological barrier scores were similarly shaped for all three age groups, as assessed by visual inspection of a boxplot (see Figure 16 in Appendix B). Results indicated that median psychological barrier scores were significantly different between groups, H(2) = 6.843, p = .033. Refer to Table 6 (below) for median and standard deviation scores.

Table 6

Median and Standard Deviation of Psychological Barriers per age group

Age group	Median	Standard Deviation
Baby Boomers	36.00	9.346
Generation X	38.00	10.399
Millennials	33.50	6.969

Post hoc analysis was carried out to determine where the difference was located. Pairwise comparisons of age groups, with a Bonferonni correction for multiple comparisons, indicated that there was a statistically significant difference between Millennials (Mdn = 33.5) and Generation X (Mdn = 38) with regards to the extent they experienced psychological barriers to climate-friendly food choices, adjusted $p = .027$. The effect size, based on Cohen's (1992) index, was near medium ($f = 0.216$), with a power of .63. As per Cohen's (1992) index, a *f* value, as a measure of effect size, of .10 is small, .25 is medium, and .40 is large.

When the outliers were removed from the data, preliminary assumption analysis indicated that the distributions of the dependent variable were similarly shaped for each group of the independent variable, as assessed by visual inspection of a boxplot (see Figure 17 in Appendix B). Results indicated that median psychological barrier scores were statistically significantly different between groups, $H(2) = 7.186$, $p = .028$. Median scores are reported in Table 7 (below).

Table 7

Median and Standard Deviation of Psychological Barriers per age group

Age group	Median	Standard Deviation
Baby Boomers	36.00	9.346
Generation X	38.00	8.372
Millennials	33.00	6.163

Post hoc analysis was carried out to determine where the difference was located. Pairwise comparisons of age groups with a Bonferonni correction for multiple comparisons indicated that there was a statistically significant difference between Millennials (Mdn = 33.93) and Generation X (Mdn = 37.66) with regards to the extent that they experienced psychological barriers to climate-friendly food choices, adjusted p = .023. The effect size, based on Cohen's (1992) index, was near medium (f = 0.186), with a power of .49.

Question 6: Is there a significant difference between different age groups with regards to how often they make climate-friendly food choices?

A one-way ANOVA was conducted to determine if there was a statistically significant difference between the different age groups with regards to how often they make climate-friendly food choices. There were no outliers detected in the data, as assessed by boxplot. Preliminary assumption testing indicated that the dependent variable was normally distributed for each age group, as assessed by skewness and kurtosis levels. Millennials had a skewness of -0.229 (SE = 0.283) and kurtosis of -0.698 (SE = 0.559), Generation X had a skewness of -0.186 (SE = 0.316) and kurtosis of -0.527 (SE = 0.623), and Baby Boomers had a skewness of 0.219 (SE = 0.550) and kurtosis of -0.516 (SE = 1.063). There was homogeneity of variances, as assessed by Levene’s test of homogeneity

of variances (p = .576). Mean and standard deviation scores are reported in Table 8 (below).

Table 8

Mean and Standard Deviation of Climate-friendly food choices per age group

Age group	Mean	Standard Deviation
Baby Boomers	28.88	6.918
Generation X	27.72	7.225
Millennials	27.83	7.545

Results indicated that participants in the three age groups did not statistically significantly differ from each other with regards to how often they made climate-friendly food choices, F (2, 143) = .172, p = .842. The effect size, based on Cohen's (1992) index was small (f = .051), with a power of .08.

Chapter 6: Discussion

Despite a growing awareness of the various climate-friendly food choices that can be made to help mitigate climate change, consumers nevertheless still choose to purchase and consume foods with high carbon footprints. It is therefore imperative to determine which factors limit the adoption of climate-friendly food choices. The primary aim of this study was to explore the extent to which the psychological barriers; denial, conflicting goals and aspirations, tokenism, and interpersonal influence, limit individuals' climate-friendly food choices in a South African context. Furthermore, the study also explored whether gender and age differences existed with regards to the extent to which the psychological barriers were experienced and how often climate-friendly food choices were made.

In this final chapter, the research results are discussed with regards to the six research questions that framed the focus of this study. Suggestions for future research are also considered and the limitations and contribution of the present study are discussed.

Psychological barriers and climate-friendly food choices

In order to address the primary aim of this study the research investigated 1) the extent to which denial, tokenism, interpersonal influence, and conflicting goals and aspirations predicted climate-friendly food choices, and 2) the relationship between these psychological barriers and climate-friendly food choices.

Psychological barriers that predict climate-friendly food choices

The results, described in Chapter 5, indicate that, collectively, the psychological barriers predicted 10.6% of the variance in climate-friendly food choices. Conflicting goals and aspirations was the largest barrier to climate-friendly food choices, followed by denial. Interpersonal influence had a positive influence on climate-friendly food choices in the

model, but due to an insignificant direct association with climate-friendly food choices, there is reason to assume that denial and conflicting goals and aspirations influenced this factor in the model. That said, food is often consumed socially and people tend to conform to social norms (Asch, 1951) and therefore it can be reasonably assumed that people's food choices are subjected to social influence. Research about climate-friendly food choices supports this assumption: A lack of social support in following a plant based diet (Hodson & Earle, 2018) and a family member's request to include meat as part of meals (Hunter & Röös, 2016) were found to limit a reduction in meat consumption. However, due to the low internal consistency ($\alpha = .533$) of this factor, further research is necessary to investigate its influence on climate-friendly food choices in South Africa. The last factor, tokenism, was not a significant predictor of climate-friendly food choices.

The results of a study by Gifford and Chen (2017), who analysed the predictive value of denial, conflicting goals and aspirations, tokenism, and interpersonal influence on the intentions to perform climate change mitigative food choices, amongst Canadian community members, yielded comparable results to those found in the present study. The four barriers collectively explained 25% of the variance in intentions to perform climate-friendly food choices, which is notably higher than the 10.6% variance found in this study. This difference could be ascribed to the difference between intentions to perform a behaviour and self-reported behaviour. The TPB posits that behaviour can be predicted by the intentions to perform the behaviour and an individual's PBC over the behaviour (Ajzen, 1991). However, the predictive strength of intentions on behaviour requires further investigation (Scalco et al., 2017) as an individual's intentions to adopt climate-friendly food choices is not necessarily an accurate indication of whether the individual would, in fact, adopt climate-friendly food choices. Furthermore, it can be assumed that cultural differences between the two samples may have also influenced the extent to which

participants were affected by psychological processes when they made food choices (see Niva, Vainio, & Jallinoja, 2017). It is interesting to note, however, that in both studies, conflicting goals and aspirations, and denial emerged as the two main barriers. The results thus suggest that these two factors are the two main predictors of intentions to perform climate-friendly food choices and self-reported climate-friendly food choices. Drawing on the Process Model of Psycho-social Barriers and Constraints and following Gaspar's (2013) sentiments regarding the importance of considering psychological processes that predict pro-environmental behaviour, a discussion of these two barriers follows next.

Conflicting goals and aspirations refers to the investment of, for example, time, effort, and money, towards an outcome that is irreconcilable with mitigative behaviour (Gifford & Chen, 2017). In other words, a person has chosen to invest towards an outcome that is anti-environmental. If the person abandons what he/she invested in, he/she risks losing the investment. For example, if an individual spends time and money to include meat in their diet, switching to a plant-based diet means they risk losing the time and money invested in following a diet that includes meat. People tend to be risk averse (Kahneman & Tversky, 1982), and perceive sure losses as more significant than possible gains (Kahneman & Tversky, 1979). As a result people often prefer to stay with their current or previous choices (i.e. maintain the status quo) (Samuelson & Zeckhauser, 1988). Furthermore, behaviours are usually goal directed. That is, a person is willing to invest in behaviours that will help them attain their goals. Also, the values, beliefs, and norms held by an individual often predict whether or not an individual will adopt certain pro-environmental behaviours (Stern, 2000; Stern et al., 1999). People therefore tend to invest in behaviours that can be justified by their beliefs and attitudes. Pro-environmental behaviour is often facilitated by intrinsic life goals (e.g. self-development, community involvement, relationships) and limited by extrinsic life goals (e.g. money, fame, image)

(Unanue et al., 2016). Furthermore, individuals who value social justice (e.g. individual freedom, environmental protection, and rights for sexual minorities) seem to have a lower barrier perception to a reduction in meat consumption, whereas individuals who value tradition (e.g. religion, home-region, and culture) and wealth (e.g. high income, high social status) seem to have a higher barrier perception to a reduction in meat consumption (Pohjolainen et al., 2015). Thus, the valuation of extrinsic life goals, tradition, and wealth often create conditions that either limit pro-environmental behaviours or facilitate anti-environmental behaviours.

South Africa has a prominent meat-eating culture that is often associated with several traditions and cultural practices. Many South African's are notoriously fond of the 'braai' (or barbeque), and various cultural traditions include the slaughtering of an animal and the cooking of its meat on an open fire. This, which is a way to eat and entertain family and friends, plays an important role in many festivities. The meat-eating culture does therefore not align with climate-friendly food choices. It is not surprising then that participants in this study were more likely to limit their food waste and consume local and seasonal food, than they were to reduce their meat consumption. A reduction in meat consumption in meat-eating cultures therefore requires a change in the culturally shared meaning of meat as the centrepiece of meals (Niva et al., 2017), thus aligning that which is culturally valued and climate-friendly food choices. In addition, the valuation of wealth has been associated with increased meat consumption (Esterhuizen, 2015) and increased meat consumption is associated with status (Chan & Zlatevska, 2019). In South Africa, household wealth increased from 2016 to 2017 (Van Tonder, Van Aardt, & De Clerq, 2017). It is therefore plausible that a growing emphasis on wealth and status in South African households further constrains a reduction in meat consumption, thus, limiting climate-friendly food choices.

According to Festinger (1957), a misalignment between a person's beliefs, attitudes, or behaviours often results in an uncomfortable psychological state of mind, known as cognitive dissonance. Should such a situation arise, the individual will attempt to modify one of the three (i.e. beliefs, attitudes, behaviours) in order to reduce the discrepancy and thus lower the discomfort. Attempts to reduce the discrepancy can take many forms. Šedová et al. (2016) identified various defence mechanisms that were used by a sample of students who were aware of the environmental impact of their food choices. Amongst other things, students concealed from themselves or repressed information that contradicted their behaviour. Denial, which refers to a disbelief or misinterpretation of the evidence that climate change exists or that changing one's behaviour will reduce climate change (Gifford & Chen, 2017), can therefore be a response to the misalignment between a person's goals and aspirations and his/her behaviour. Furthermore, denial could be due to a lack of knowledge. It seems obvious that a person would be reluctant to change their behaviours towards a cause of which they have little knowledge or do not believe is an issue that requires action. In 2009, the BBC World Service Trust and Learning group conducted a study to establish the South African public's understanding of climate change (Neville, 2010). The findings indicated that most South Africans were aware of climate change, but that they did not understand what it meant and often used the term interchangeably with the depletion of the ozone. Furthermore, they were hesitant to change their lifestyles to adopt mitigative behaviours, as they were not convinced of the impact that mitigative behaviour would have on climate change. In a UK study by Lorenzoni, Nicholson-Cole, and Whitmarsh (2007), that explored the barriers with regards to engaging with climate change, one participant noted that: " I would be doing more things to prevent this, and I would be speaking more about it [climate change] if I could get some clarity on it. The cause and effect of it all" (p 450). It therefore seems that people are

hesitant to invest in mitigative behaviours if they do not have the necessary knowledge about climate change, or if they do not believe that it requires attention, or that their investment would make a difference.

The association between psychological barriers and climate-friendly food choices

Overall, the four psychological barriers, averaged across all items, were statistically negatively correlated with climate-friendly food choices. That is, the greater a person's barrier perceptions were, the less frequently they engaged in climate-friendly food choices. Gifford and Chen (2017) found similar results in their study regarding the association between psychological barriers and mitigative food choice intentions. Results indicated a negative correlation (r = -.49). This denotes that the stronger a person's barrier perception the lower their intentions to adopt mitigative food choices. On the one hand, experiencing lower barrier perceptions to performing a behaviour could facilitate, or at least not limit, the adoption of the behaviour. On the other hand, an increase in the adoption of climate-friendly food choices may reduce the barrier perceptions that limit climate-friendly food choices. This could be because consumers become more familiar with climate-friendly food choices (e.g. purchasing and preparing vegetarian meals and managing food waste) when these choices are made on a regular basis. The tendency to prefer foods with which one is familiar was found in a study by Pohjolainen et al. (2015). This could possibly explain the reason why participants in a study by Mäkiniemi and Vainio (2014), who followed a vegetarian diet, reported experiencing fewer barriers to climate-friendly food choices than people who consumed meat.

Group differences

The current study also investigated whether there were gender and age differences with regards to psychological barriers and climate-friendly food choices. A discussion of these results follows next.

Gender differences

Results indicated that on average, across all barriers, there was no significant differences between males and females with regards to the extent to which they experienced psychological barriers to climate-friendly food choices. This was unexpected, as past research has indicated that males experience stronger barriers to climate-friendly food choices than females do, specifically with regards to denial and tokenism (Gifford & Chen, 2017). This could possibly be ascribed to the positive association between meat consumption and masculinity (Rothgerber, 2013). Males are more likely than females to deny that their food choices have an impact on climate change and prefer not to change their eating habits (Mäkiniemi & Vainio, 2014). Females, however, report structural barriers (high prices and availability) as more limiting with regards to their climate-friendly food choices (Mäkiniemi & Vainio, 2014). It is therefore interesting that in the current study males and females experienced these barriers to the same extent. Is it possible that, in South Africa, both males and females attach the same traditional and established meanings to food that would limit their climate-friendly food choices to the same extent?

The results of this study further indicated that there were no significant differences between males and females with regards to the frequency with which they made climate-friendly food choices. The effect of gender on pro-environmental consumption is inconclusive and often contradictory. Some studies have indicated that females (vs males) are more conscious of food waste and report wasting less food (Secondi et al., 2015),

express stronger mitigative food choice intentions (Gifford & Chen, 2017), and are more conscious of environmental friendliness when making food choices (Hartikainen et al., 2014). However, gender is a social construct that differs across cultures (see Neculaesei, 2015). This could possibly explain why de Boer et al. (2016), when investigating the willingness to reduce meat intake and purchase local food amongst males and females in a Dutch and an American sample, found varying gender differences amongst the two cultures. De Boer et al. (2016) found that in both samples females were more willing than males to reduce their meat intake. However, when considering purchasing local food, there were no group differences in the Dutch sample, but females in the American sample were more willing to purchase local food than their male counterparts. Furthermore, in a study conducted amongst rural residents in China, Wang et al. (2014) found that females were less likely to be involved in sustainable consumption behaviours and less concerned about the environment than their male counterparts.

Age differences

Results indicated that Millennials' barrier perceptions were significantly lower than that of Generation X. That is, the barrier perceptions were significantly higher for individuals born during 1966 to 1982 than those born after 1982. Baby Boomers did not significantly differ from the other two age groups with regards to their barrier perceptions. Gifford and Chen (2017) found that older individuals were more likely than younger individuals to indicate that adopting climate-friendly food choices would conflict with their current goals. A possible explanation for this could be that older individuals have more responsibilities, such as children in the household, that make it more difficult for them to adapt their food choices to mitigate climate change. For instance, Pohjolainen et al. (2015) found that couples with children in the household experienced stronger barriers to reducing their meat intake. It can be argued that the age-effect would vary depending on

the specific climate-friendly action. That is, different age groups experience barriers to different food choices. For instance, research indicated that younger age groups experienced stronger barriers to a reduction in meat consumption than was the case in older age groups (Pohjolainen et al., 2015).

Despite Generation X experiencing stronger psychological barriers to climate-friendly food choices than Millennials, the findings indicated that the three age groups did not significantly differ from each other with regards to how often they made climate-friendly food choices. Studies have shown that older individuals, in comparison to younger individuals, place a higher value on the environmental friendliness of a product when making consumption choices (Hartikainen et al., 2014), report higher energy curtailment behaviour (Yang, Zhang, & Zhao, 2016), and sustainable purchasing behaviour (Cerri, Testa, & Rizzi, 2018). However, there is evidence that pro-environmental intention, valuation for the environment, environmental sensitivity, and pro-environmental knowledge decline with age (Wang et al., 2014). When comparing different age groups, various studies have found an inverted U-shaped effect on consumption: Younger age groups and older age groups consume less than consumers in the middle age group. For example, the average energy consumption of individuals seems to increase from the age of 25 to 50 and then declines thereafter (Bardazzi & Pazienza, 2017). Similarly, generations born after World War II (i.e. Baby Boomers and younger generations) have a higher fuel expenditure per adult than younger generations and generations born before World War II (Bardazzi & Pazienza, 2018). It is possible that consumers in the middle age group (i.e. Generation X) are of the age where they still have children in the household, which results in more electricity being used, more petrol being used, and greater difficulty in following a climate-friendly diet. In other words, consumption increases with the number of individuals in the household. However, this is not supported by the findings in this study,

as the three age groups did not statistically differ from each other with regards to how often they made climate-friendly food choices. This begs the question, as to whether South Africans' climate-friendly food choices are influenced by a common factor/factors that may be prevalent for all age groups? Is it possible that the culturally shared idea of what constitutes good food is so strong that age has an insignificant effect on whether someone will adopt climate-friendly food choices?

Summary and Conclusion

This study examined the extent to which the psychological barriers suggested by Gifford and Chen (2017) namely, denial, conflicting goals and aspirations, tokenism, and interpersonal influence predicted climate-friendly food choices in South Africa. The study furthermore questioned whether there were significant differences between gender and age groups, respectively, with regards to their psychological barrier perceptions and climate-friendly food choices. Based on the current sample, how often people make climate-friendly food choices is mostly limited by their goals and aspirations that are not in line with mitigative behaviours, and by their feelings of scepticism or doubt about climate change and/or whether humans can in fact make a difference by adopting mitigative behaviour. A stronger barrier perception was also associated with a lower frequency of climate-friendly food choices. Males and females did not differ significantly from each other with regards to their psychological barrier strength perceptions and how often they made climate-friendly food choices. Therefore, it is imperative to focus on both males and females when implementing climate change mitigative programmes. With regards to the different age groups, consumers who were born during 1966 to 1982 (categorised as Generation X) had stronger barrier perceptions than Millennials (born after 1982). Baby Boomers' (born during 1938 to 1965) barrier perceptions however did not significantly differ from the other two age groups' barrier perceptions. It could therefore be useful to

further explore the reasons why Generation X have a stronger barrier perception than Millennials and how this barrier perception can be reduced. It can also be helpful to target Millennials when implementing climate change mitigative programmes as they already have a lower barrier perception, which could result in a greater adoption of climate-friendly food choices. The three age groups, however, did not significantly differ from each other with regards to how often they exercised climate-friendly food choices.

Limitations and suggestions for future research

The sample of the study was limited to individuals who live in Gauteng with access to the internet, thus excluding a portion of the South African population who are unable to access the internet. Further research could expand the sample to include individuals who do not have access to the internet and who reside outside of Gauteng. The proportion of males and females in the study were similar to the population proportion of males and females, however, the sample of the study was accessed by means of convenience and snowball sampling and the findings cannot therefore be generalised to the South African population. The difference between age groups with regards to barrier perceptions and climate-friendly food choices requires further investigation in a representative sample. Nonetheless, the research provided valuable information about the psychological processes that limit consumers' responses to climate-friendly food choices in a South African context. Future research could attempt to replicate this study using a sample that is representative of the South African population. Furthermore, the research also indicated how often participants in the study made climate-friendly food choices. However, participants' current level of knowledge about the effect of their food choices on climate change was not considered. It is suggested that future research include information about participants' level of knowledge about climate-friendly food choices. Information about the association between knowledge about this topic and food choices could prove

insightful. Furthermore, an understanding of the culturally shared ideas of food, such as the emphasis placed on meat as the centrepiece of many South African meals, and how these relate to climate-friendly food choices could also be of value in the fight for sustainable food production and consumption. Lastly, the relationship between wealth and meat consumption can be explored in the South African context.

Contribution of the study

This study provided a first look at the psychological barriers that limit the adoption of climate-friendly food choices in a South African context. It furthermore suggested that the culturally shared meanings of food in South Africa as well as the increasing wealth of the population could limit pro-environmental change. This study also undoubtedly created awareness of the impact of individual food choices on the environment for many of the participants and indicated that a lack of knowledge about the impact of one's personal food choices could act as a barrier to pro-environmental behaviour.

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Appendix A: Questionnaire

Welcome to My Survey

This questionnaire was designed to measure how often you make certain food-related decisions in order to mitigate climate change and to identify specific psychological processes that are involved in this decision-making process.

Climate change is defined as a change in the Earth's climate, which could result in changes in rainfall patterns and the Earth's temperature. These changes could result in a broad range of environmental risks that can threaten both humans and the natural environment. Climate change is often described as an environmental problem. According to some scientists, humans can help mitigate climate change by making certain food-related choices, such as reducing meat and dairy consumption, choosing locally and organically grown food, and reducing food waste. These choices, known as climate-friendly food choices, are decisions that are made with regards to the food products purchased and used, considering the mitigative impact it might have on climate change.

This questionnaire should not take up more than 10 minutes of your time. Please answer the following questions as honestly as possible. Your answers will be kept confidential and anonymous.

I have read the consent page and agree to participate in the study. Click on the link for more details about my study: https://elzarietheron.wixsite.com/myresearch.

☐ I confirm

Section 1 of 2

Please answer the following questions about yourself.

2. What is your gender?

☐ Female

☐ Male

3. In what year were you born? (enter 4-digit birth year; for example, 1976)

4. In which province of South Africa do you live?

☐ Northern Cape

☐ Western Cape

☐ Gauteng

☐ Free State

☐ Mpumalanga

☐ Eastern Cape

- [ ] KwaZulu-Natal
- [ ] Limpopo
- [ ] North West

5. Which of the following best describes your current relationship status?

- [ ] Married
- [ ] Widowed
- [ ] Divorced
- [ ] Separated
- [ ] In a domestic partnership or civil union
- [ ] Single, but cohabiting with a significant other
- [ ] Single, never married

6. What is the highest degree or level of school you have completed? (If you're currently enrolled in school, please indicate the highest degree you have received)

- [ ] Less than a high school degree
- [ ] High school degree or equivalent
- [ ] Higher Certificate
- [ ] Diploma & Advanced Certificate
- [ ] Bachelor's Degree & Advanced Diploma
- [ ] Honours Degree & Postgraduate Diploma
- [ ] Master's Degree
- [ ] Doctoral Degree

7. What is your approximate average household income per year?

- [ ] R0 - R11 600
- [ ] R11 601 - R49 000
- [ ] R49 001 - R109 000
- [ ] R109 001 - R234 000
- [ ] R234 001 - R378 000
- [ ] R378 001 - R783 000
- [ ] R783 001 - R1 693 000
- [ ] R1 693 001 +

Section 2 of 2

Please indicate how often you make the following food-related choices with the intention to mitigate climate change. You can do this by choosing the option that best describes you. [1]

8. I try to select foods that have as small a negative climate effect as possible.

9. I favour local food.

10. I avoid the use of imported food products transported by air.

11. I eat seasonal food.

12. I limit the consumption of meat and dairy products.

13. I try to limit food waste.

You have now rated how often you make certain food-related choices with the intention of mitigating climate change. These choices are often only possible if we change certain aspects of our daily lives, which can be costly, time-consuming or not justified in light of other pro-environmental actions already taken. For example, a person might choose to purchase locally produced fruits and vegetables only, in order to mitigate climate change. This choice could result in a dietary change depending on the season. What follows is a number of statements made with regards to climate change and the food-related choices and changes that can be made in order to mitigate climate change. Please indicate, on a five-point scale for each of the statements, how much it reflects your own view (1=I strongly disagree, 5= I strongly agree). You can do this by clicking on the star that best represents your personal view.

14. I have spent quite a bit of money on my current choices, so I would lose too much if I changed now.

15. Honestly, I don't think that the "problem" that this would solve is actually a problem.

16. I'm satisfied with my current way of doing things.

17. I haven't done this mainly because changing involves some risk.

18. My environmental actions already make enough of a difference.

19. There's no need to make these changes because I'm not convinced that a serious environmental problem even exists.

20. Even if I decided to make these changes, there would be too many other obstacles to overcome.

21. I'm unsure that these changes would be an improvement over my current choices.

22. It's too difficult for me to make these changes.

[1] Participants were asked to rate how often they make the following food-related choices by using a seven-point Likert scale where 1=never, 2=less than once a year, 3=once or a few times a year, 4=once or a few times during 6 months, 5=once or a few times a month, 6=once or a few times a week, and 7=almost daily or daily.

23. I’m concerned that these changes will take up too much of my time.

24. If I made the necessary changes, I probably would be embarrassed when others notice what I was doing.

25. The pro-environmental behaviours that I currently engage in make further changes unnecessary.

26. There’s no need to change because the current “environmental crisis” has been exaggerated.

27. Making these changes would be criticized by those around me.

28. Humankind cannot make a difference when it comes to saving the earth, so there is no point for me to change.

29. Only fake experts promote these changes.

30. I’m content with the extent to which my current choices reflect who I am as a person.

SEND

Appendix B: Figures

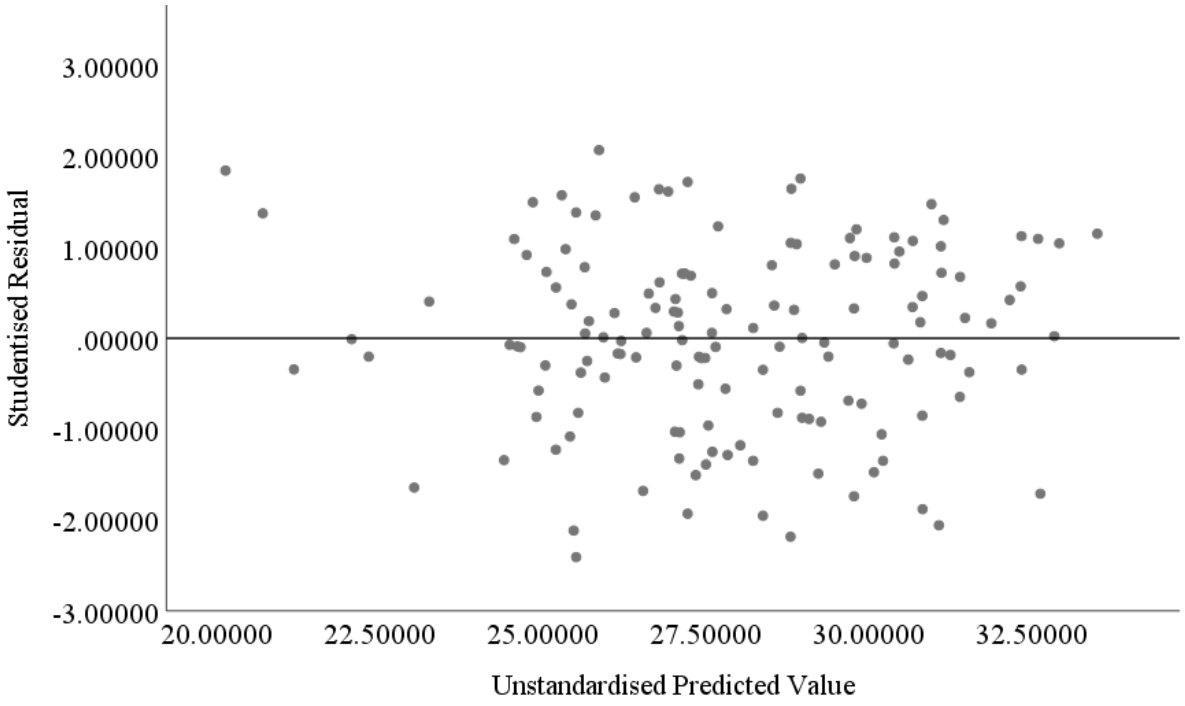

Figure 1. Scatterplot of studentised residuals against unstandardised predicted values.

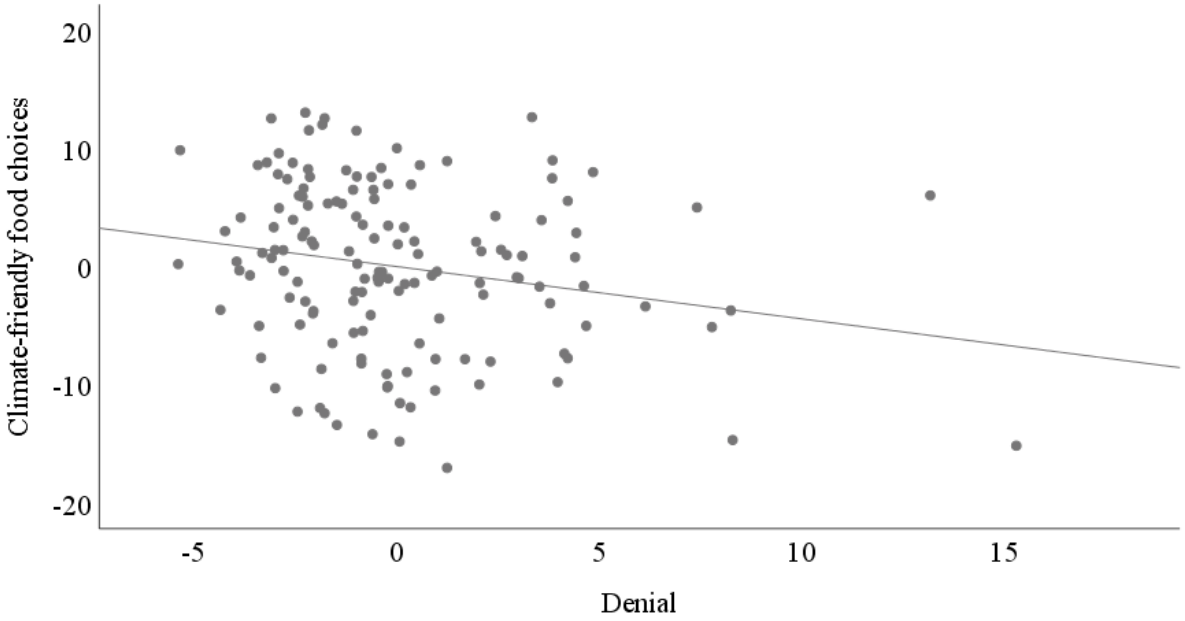

Figure 2. Partial regression plot of Climate-friendly food choices by Denial.

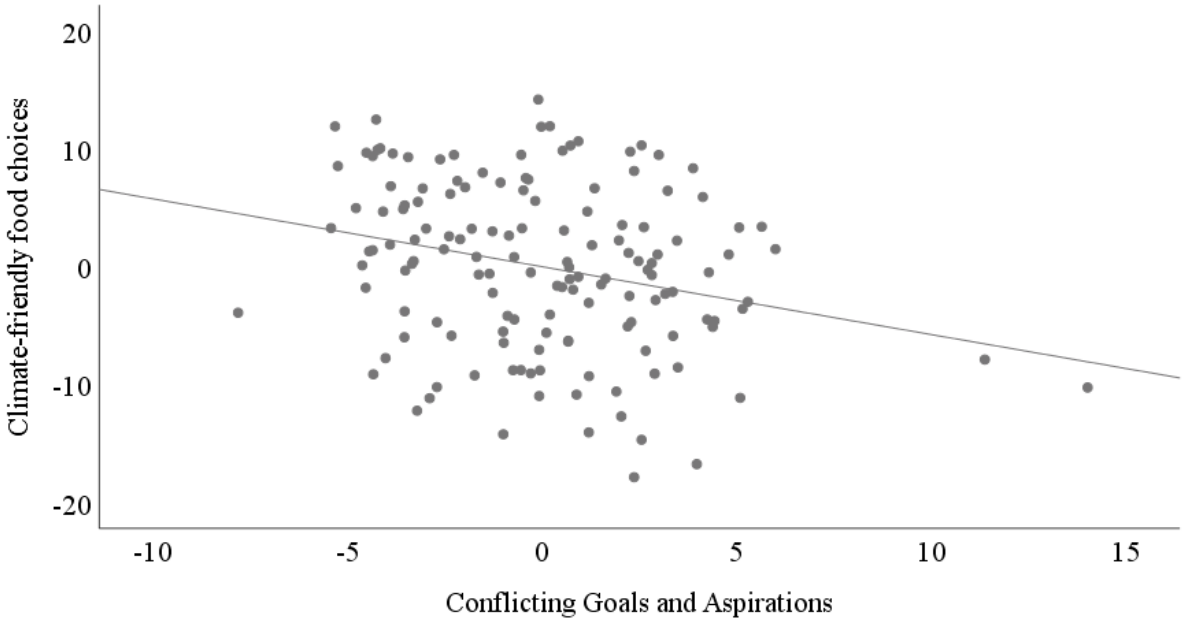

Figure 3. Partial regression plot of Climate-friendly food choices by Conflicting goals and Aspirations.

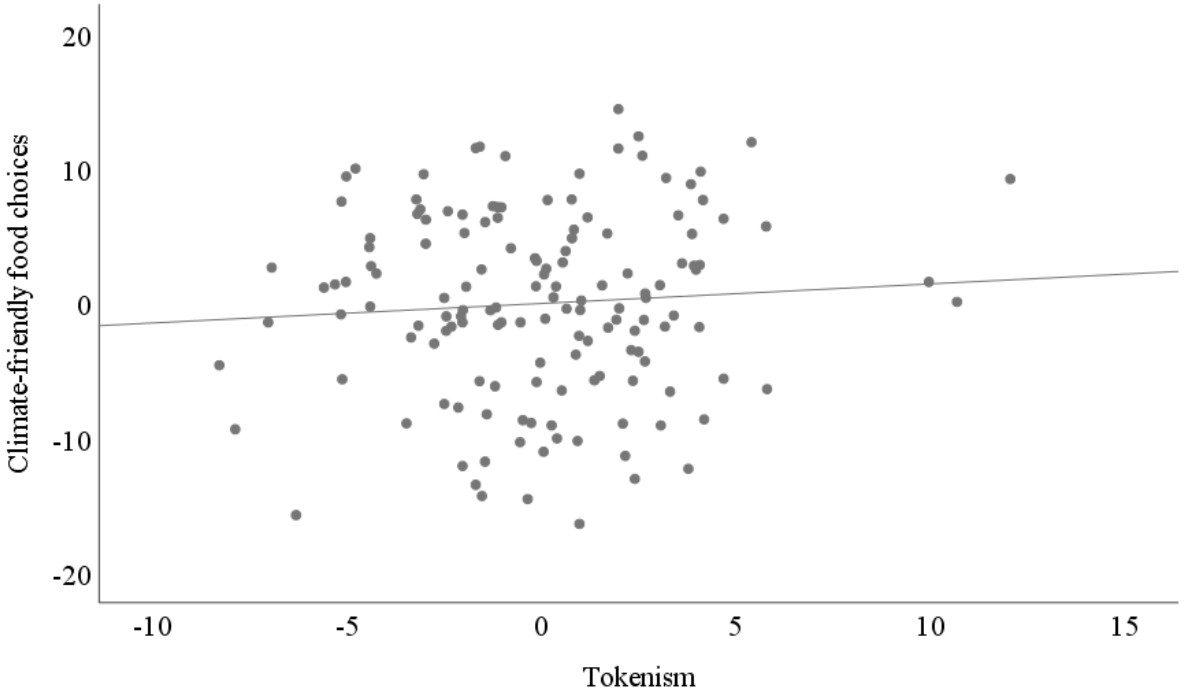

Figure 4. Partial regression plot of Climate-friendly food choices by Tokenism.

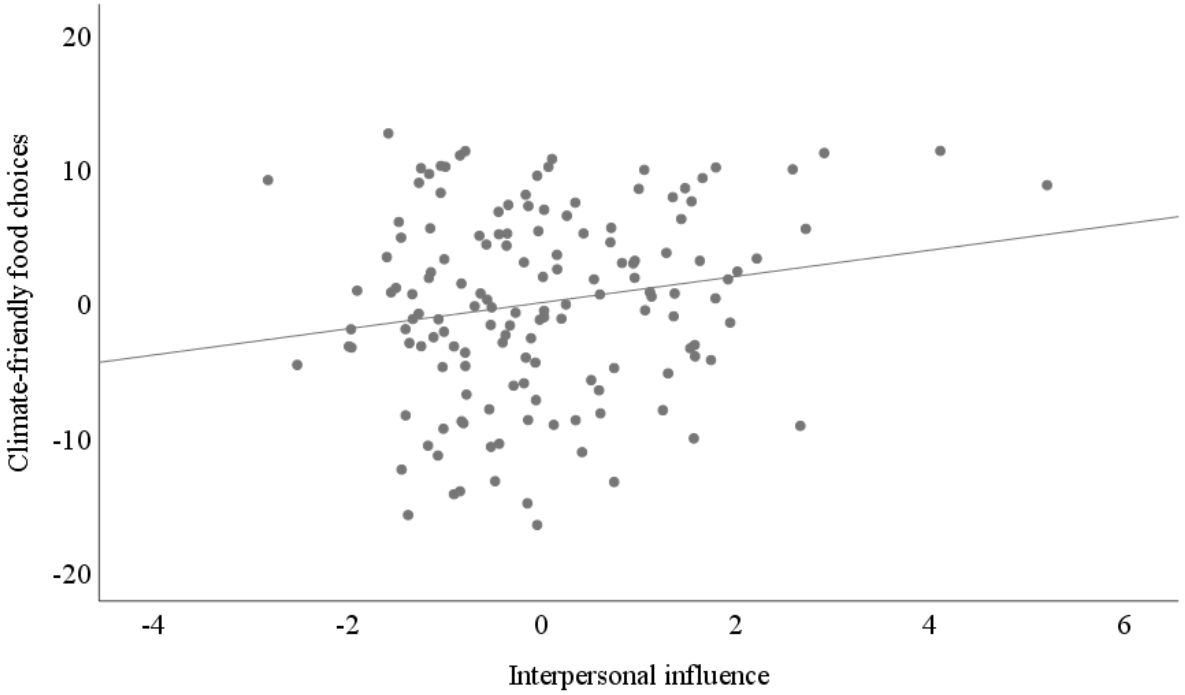

Figure 5. Partial regression plot of Climate-friendly food choices by Interpersonal influence.

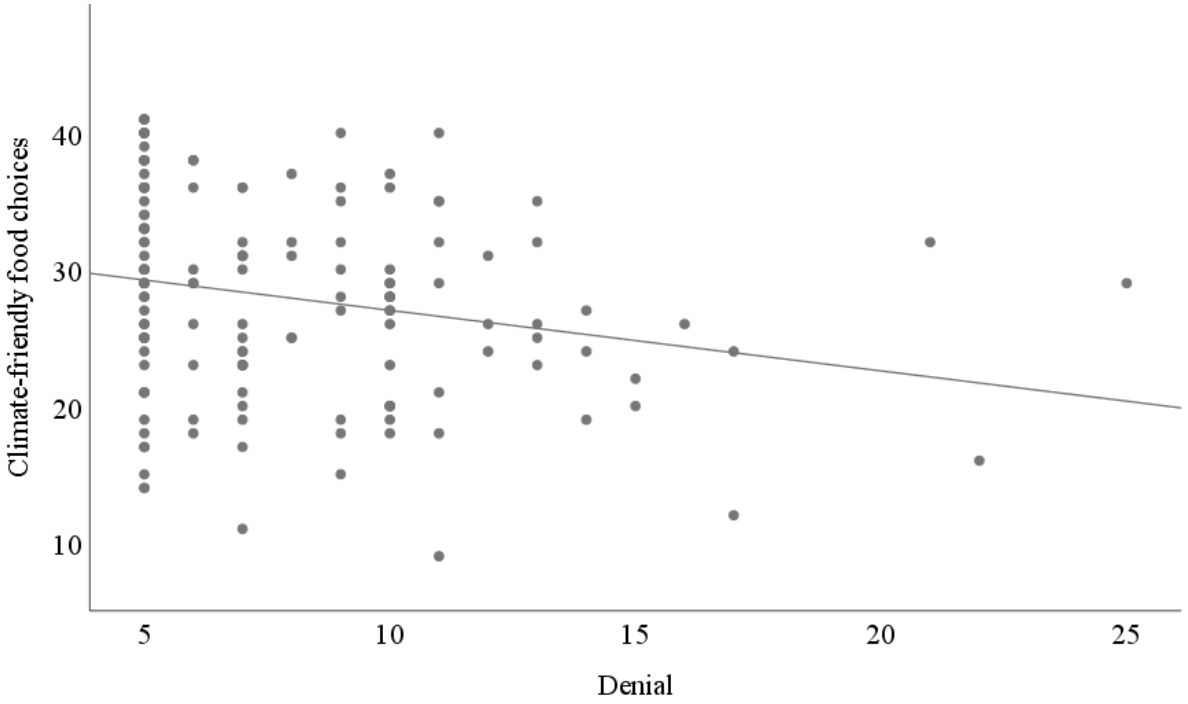

Figure 6. Scatterplot of Climate-friendly food choices by Denial.

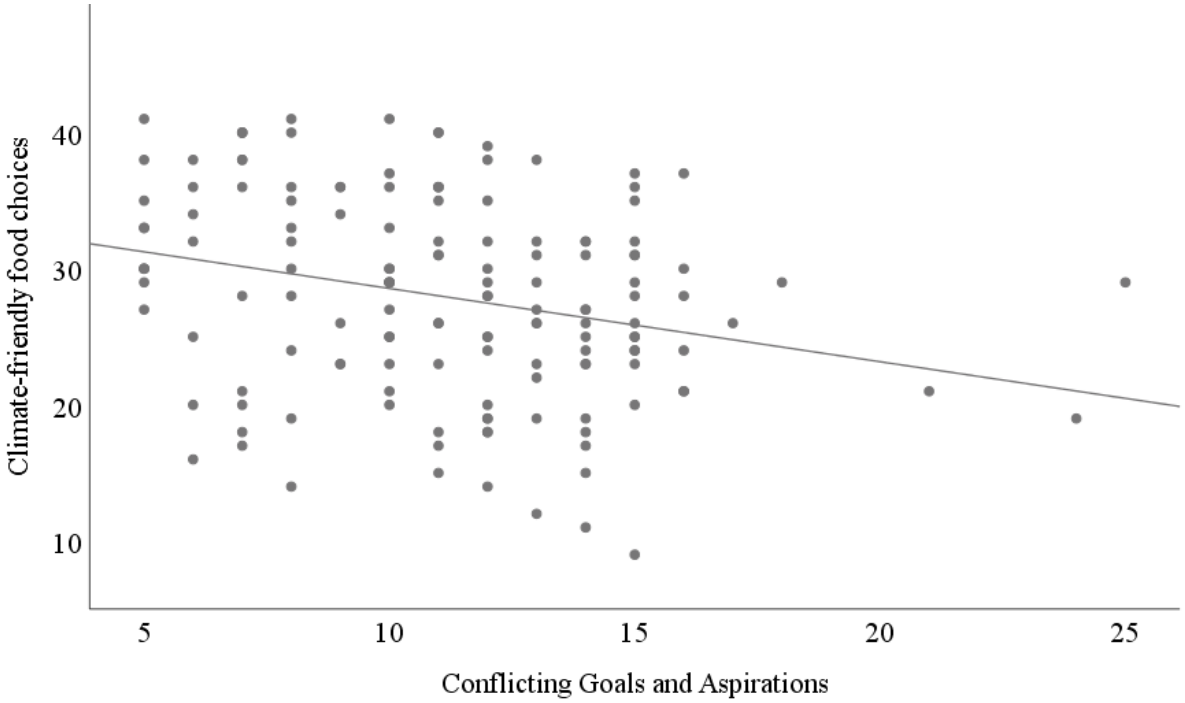

Figure 7. Scatterplot of Climate-friendly food choices by Conflicting goals and Aspirations.

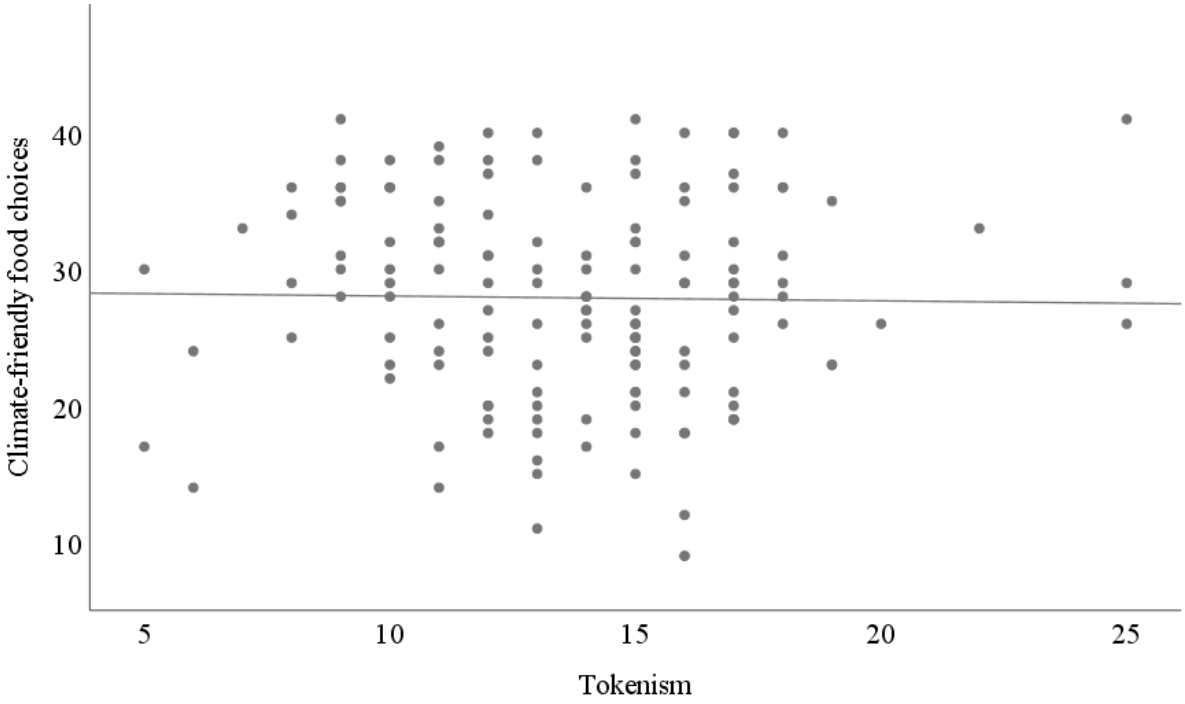

Figure 8. Scatterplot of Climate-friendly food choices by Tokenism.

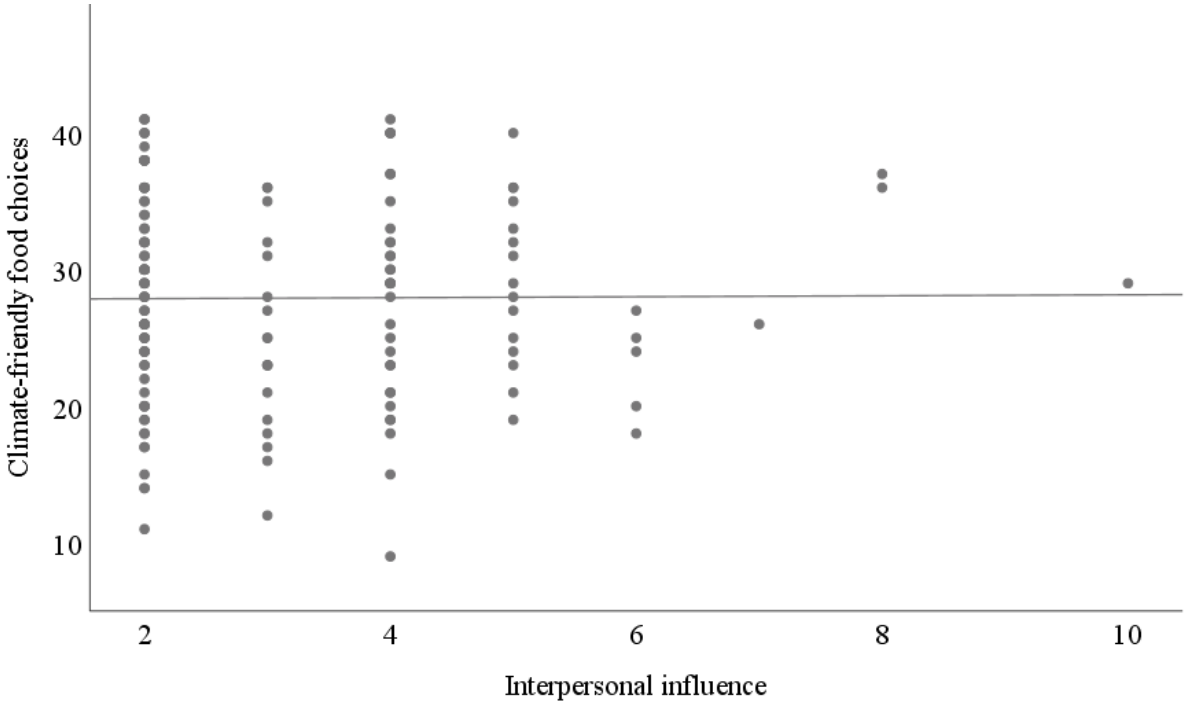

Figure 9. Scatterplot of Climate-friendly food choices by Interpersonal influence.

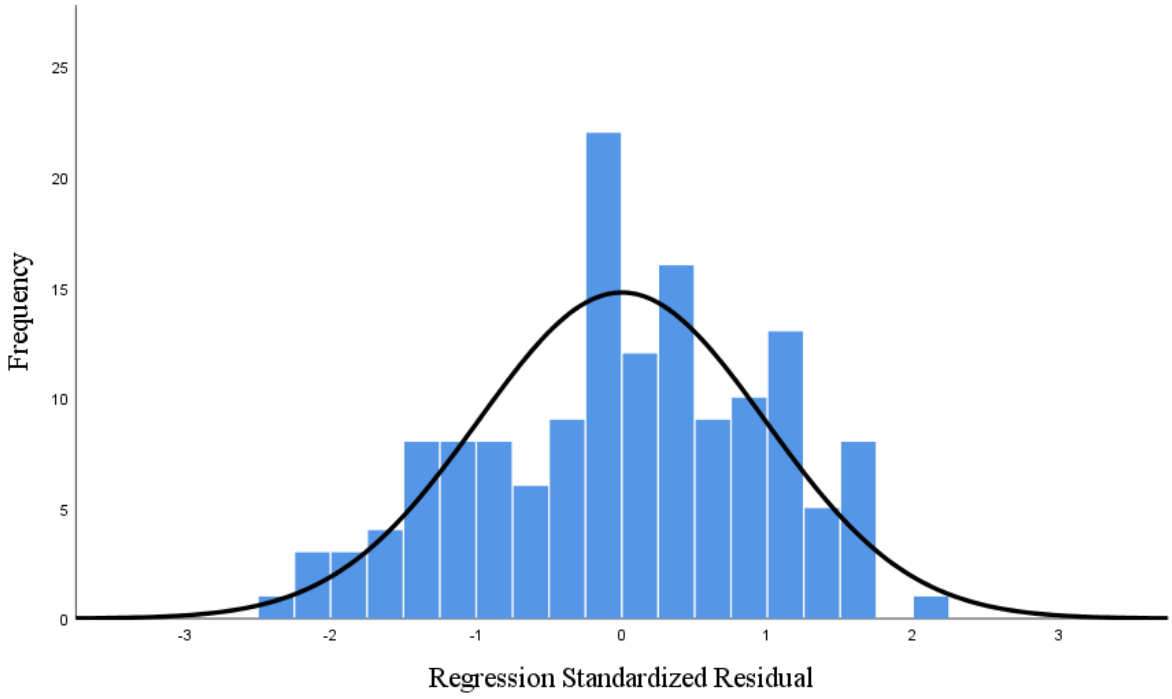

Figure 10. Histogram with superimposed normal curve. Dependent variable: Climate-friendly food choices.

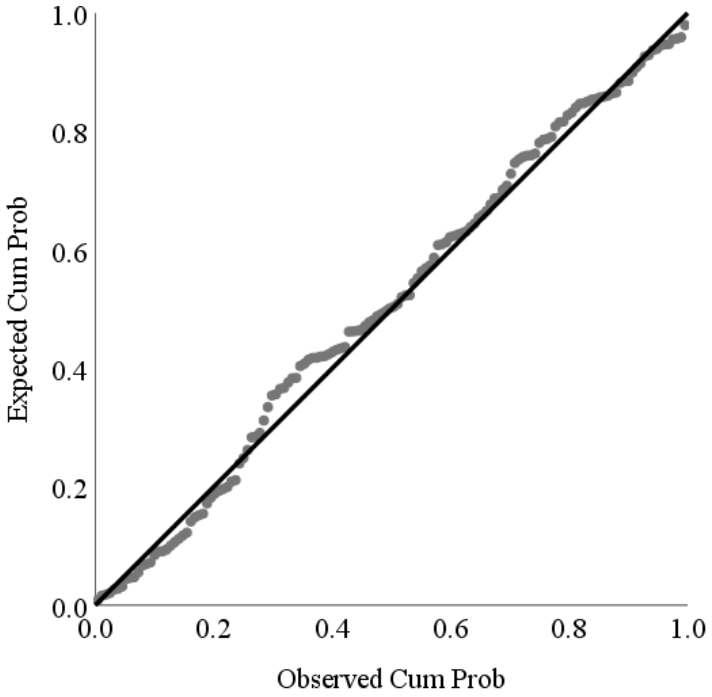

Figure 11. Normal P-P Plot of Regression Standardised Residuals. Dependent variable: Climate-friendly food choices.

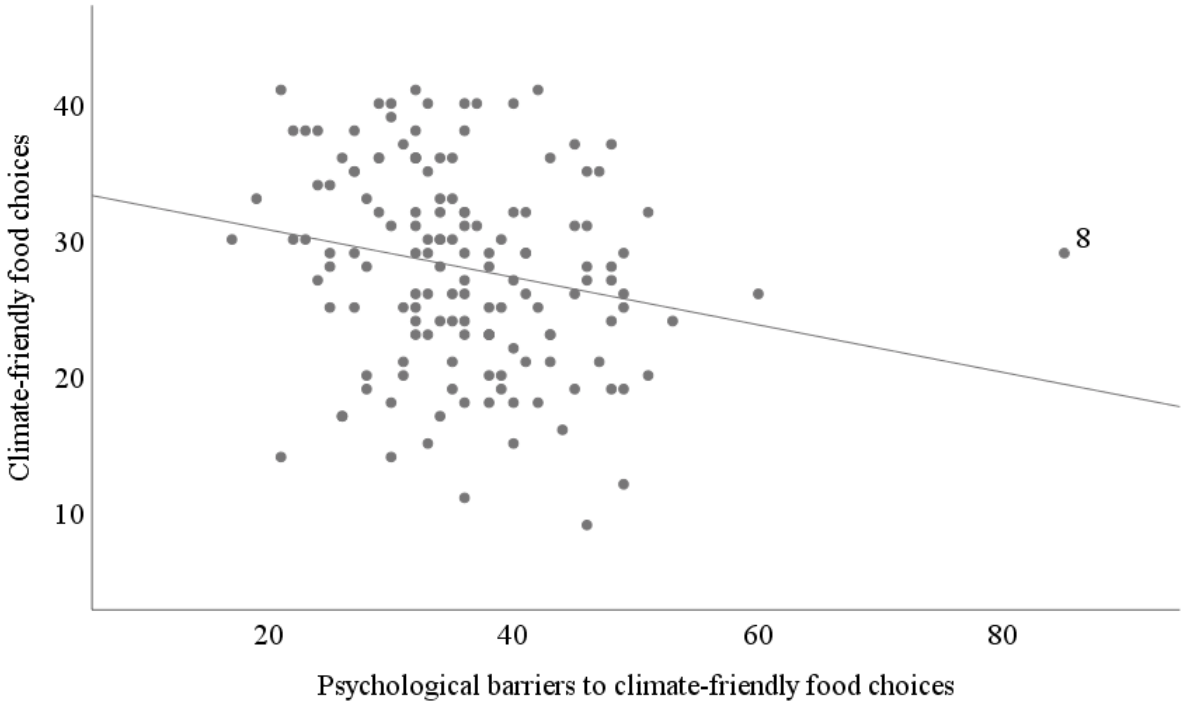

Figure 12: Scatterplot of Climate-friendly food choices by Psychological barriers to climate-friendly food choices.

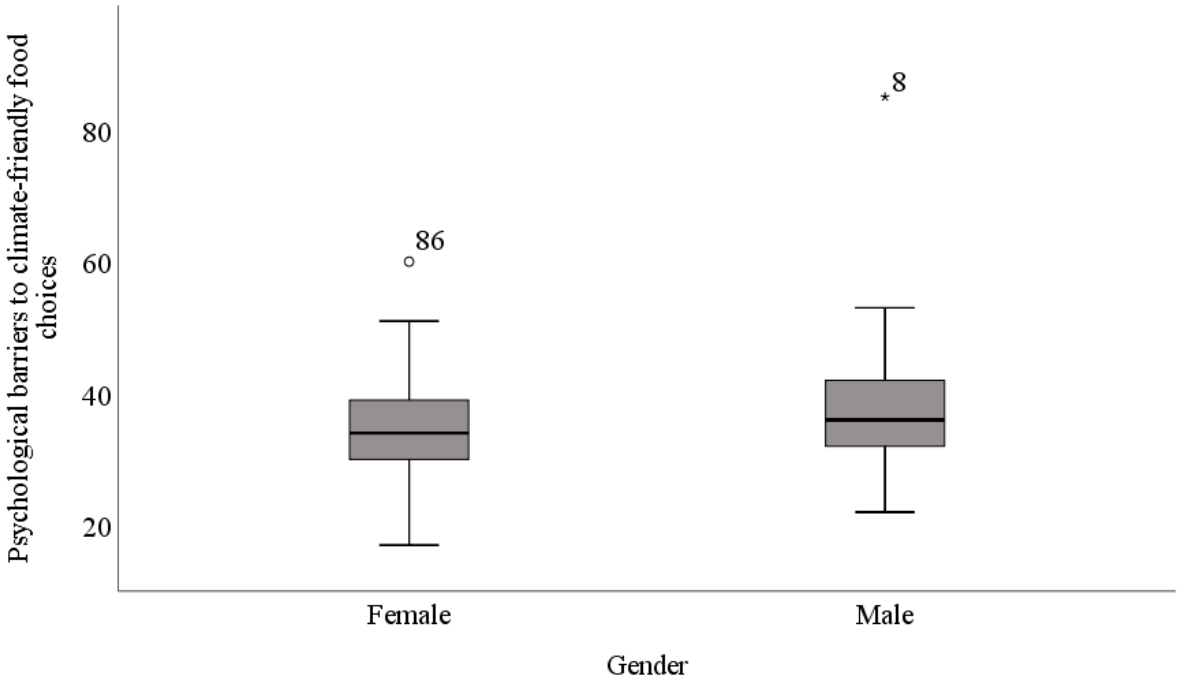

Figure 13: Boxplot of Psychological barriers to climate-friendly food choices by Gender.

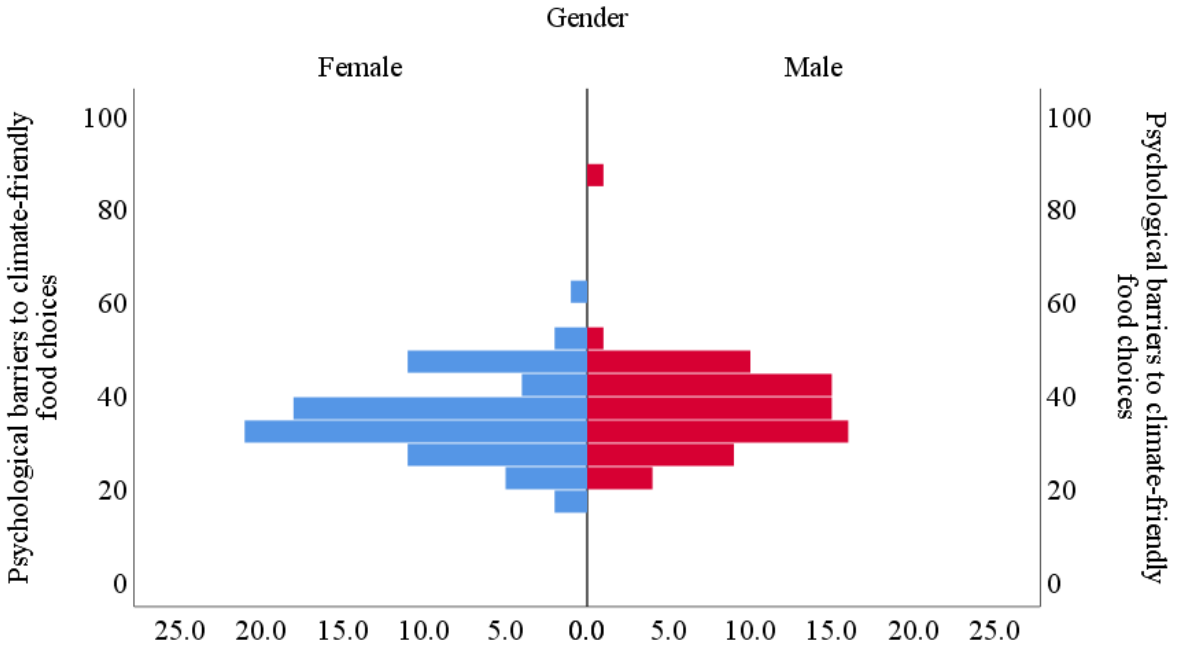

Figure 14: Population pyramid frequency of Psychological barriers to climate-friendly food choices by Gender.

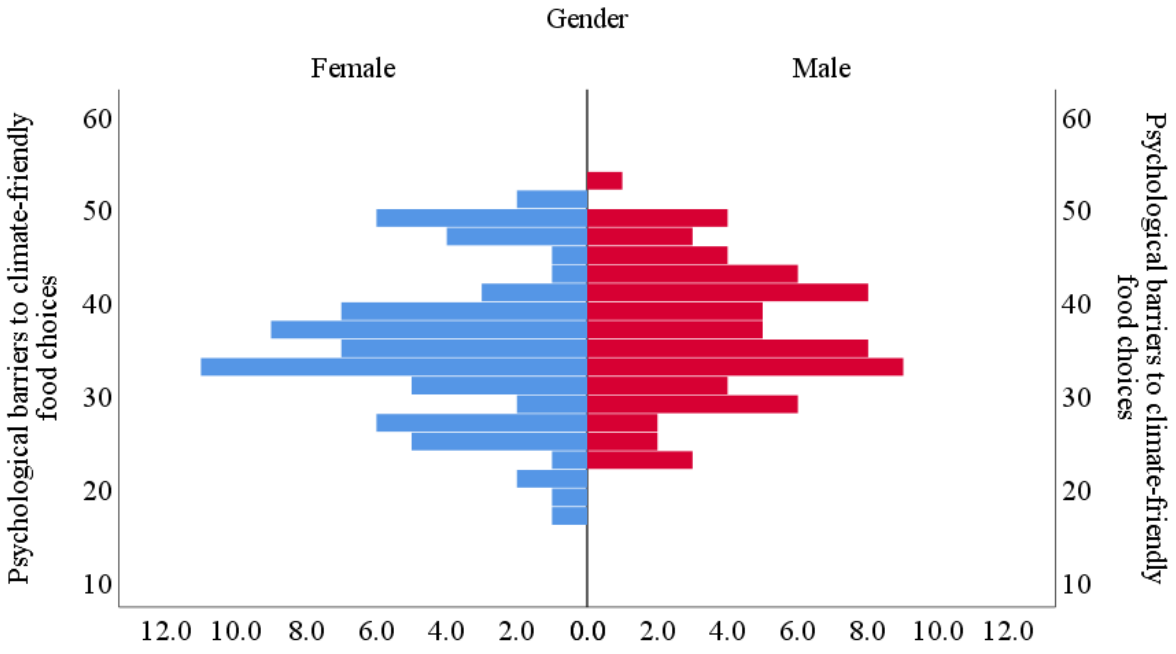

Figure 15: Population pyramid frequency of Psychological barriers to climate-friendly food choices by Gender (outliers excluded).

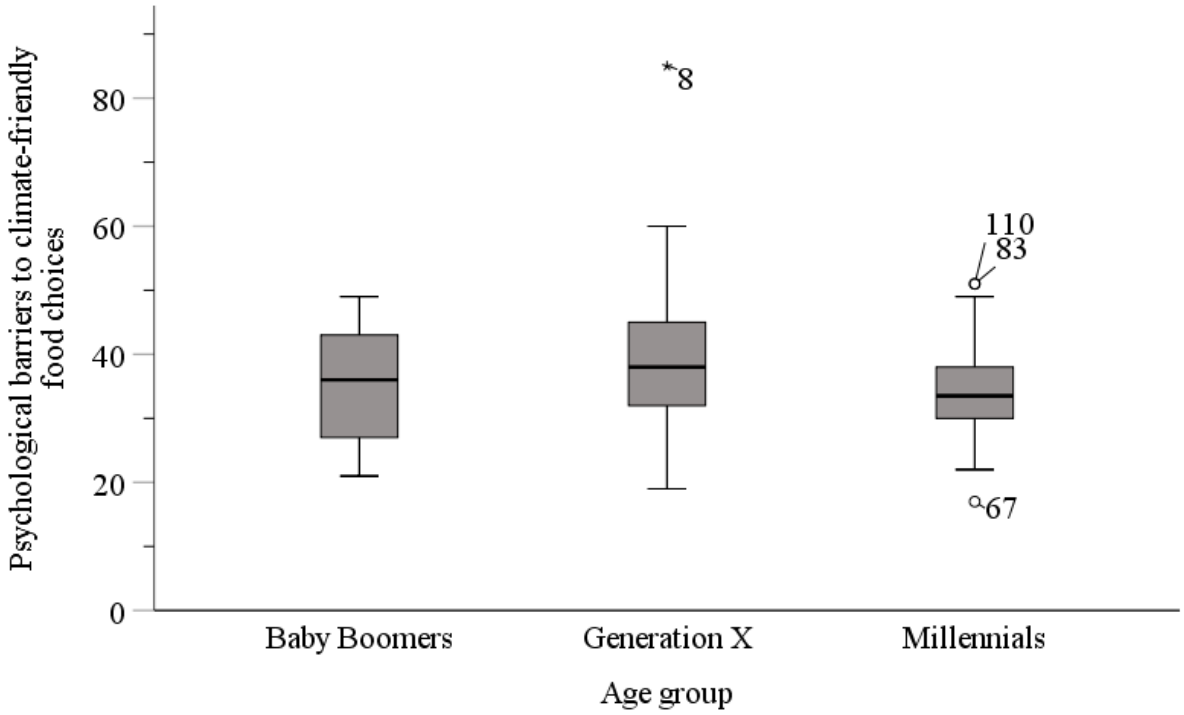

Figure 16: Boxplot of Psychological barriers to climate-friendly food choices by Age group (including outliers).

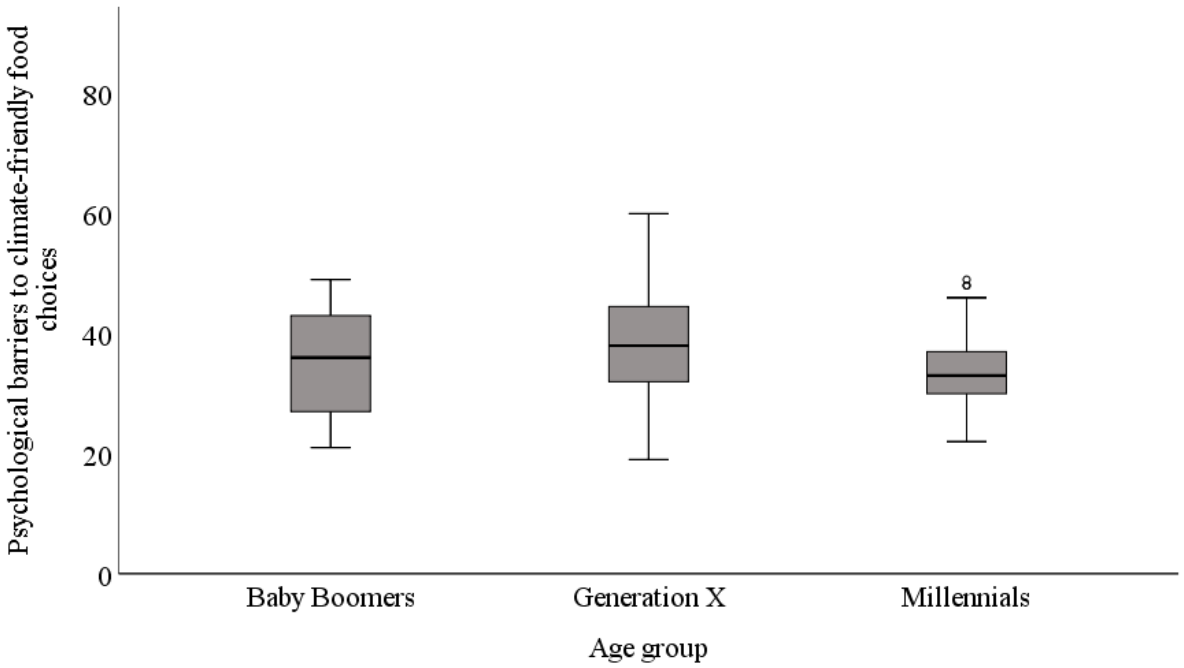

Figure 17: Boxplot of Psychological barriers to climate-friendly food choices by Age group (excluding outliers).

Appendix C: Consent letter

Ethical clearance Ref. No: PERC-17034

Dear Prospective Participant,

You are invited to participate in a survey conducted by Elzarie Theron under the supervision of Sean Hagen, a lecturer in the Department of Psychology towards a Master's in Research Psychology at the University of South Africa.

The survey you have received has been designed to study the psychological processes that influence climate-friendly food choices. You were selected to participate in this survey because you are 18 years or older, and you live in Gauteng. By completing this survey, you agree that the information you provide may be used for research purposes, including dissemination through peer-reviewed publications and conference proceedings.

It is anticipated that the information we gain from this survey will help us to develop intervention strategies to address pro-environmental consumption in South Africa. You are, however, under no obligation to complete the survey and you can withdraw from the study prior to submitting the survey. The survey is developed to be anonymous, meaning that we will have no way of connecting the information that you provide to you personally. Consequently, based on the anonymous nature of the survey you will not be able to withdraw from the study once you have clicked the send button. If you choose to participate in this survey it will take up no more than 10 minutes of your time. You will not benefit from your participation as an individual, however, it is envisioned that the findings of this study can contribute to our understanding of the psychological processes involved in pro-environmental decision making. We do not foresee that you will experience any negative consequences by completing the survey. You will not be required to provide any details about yourself or anyone else that will make it possible for us to identify you. All information will be kept confidential. Also, the findings will be reported from the perspective of the participating group and not from the perspective of an individual participant.

The records will be kept for five years for audit purposes where after records will be permanently destroyed. Hard copies will be shredded and electronic versions will be permanently deleted from the hard drive of the computer. You will not be reimbursed or receive any incentives for your participation in the survey.

The research was reviewed and approved by the Ethics Committee of the department of Psychology at Unisa. The primary researcher, Elzarie Theron, can be contacted during office hours at 36100536@mylife.unisa.ac.za. The study leader, Sean Hagen, can be contacted during office hours at hagensn@unisa.ac.za. Should you have any questions regarding the ethical aspects of the study, you can contact the chairperson of the Ethics Committee, Prof P Kruger, during office hours at krugep@unisa.ac.za. Alternatively, you can report any serious unethical behaviour at the University's Toll Free Hotline 0800 86 96 93.

You are deciding to participate in the study by continuing to the next page. You are free to withdraw from the study at any time prior to clicking the send button.