FINNISH CONSUMERS' WILLINGNESS TO CHANGE THEIR CONSUMPTION TO MITIGATE CLIMATE CHANGE

Suomalaisten kuluttajien halukkuus muuttaa kulutustaan ilmastonmuutoksen hillitsemiseksi

Lappeenranta–Lahti University of Technology LUT
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ABSTRACT

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Climate change is one of the biggest challenges in our time and everybody's actions are needed in mitigating it. Studies have shown that consumers have one of the biggest roles in mitigating climate change by changing their consumption. The aim of this bachelor's thesis is to study if Finnish consumers are willing to change their consumption to mitigate climate change.

This research was conducted as quantitative research by using data that was collected in 2019 by Finnish Taloustutkimus. 2059 Finnish individuals between the ages of 18-70 answered the questionnaire. Based on the data three research questions and five hypotheses were made which were studied with the help of linear regression analysis.

The result show that Finnish consumers' attitudes, subjective norms, perceived behavioral control, demographics, and feeling powerless affect their willingness to change their consumption. The main findings of this research are that there is a positive linear connection between willingness to mitigate and attitude towards climate change. Results also indicate that younger consumers, women, and consumers from Southern Finland are more willing to change their consumption.

TIIVISTELMÄ

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Kauppatieteiden kandidaatintutkielma
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Ilmastonmuutos on yksi aikamme suurimmista haasteista ja sen hillitsemiseksi tarvitaan kaikkien toimia. Tutkimukset ovat osoittaneet, että kulutuksen muuttamisella kuluttajilla on yksi suurimmista rooleista ilmastonmuutoksen hillitsemisessä. Tämän kandidaatintutkielman tarkoituksena on tutkia, ovatko Suomalaiset kuluttajat halukkaita muuttamaan kulutustaan ilmastonmuutoksen hillitsemiseksi.

Tämä tutkimus toteutettiin kvantitatiivisena tutkimuksena käyttäen dataa, jonka Taloustutkimus oli kerännyt vuonna 2019. 2059 suomalaista iältään 18–70 oli vastannut kyselyyn. Datan perusteella muodostettiin kolme tutkimuskysymystä ja viisi hypoteesia, joita tutkittiin lineaarisen regressioanalyysin avulla.

Tulokset näyttävät, että suomalaisten kuluttajien asenteet, subjektiiviset normit, koettu käyttäytymisen hallinta, demografiset tekijät ja voimattomuuden tunne vaikuttavat heidän halukkuuteensa muuttaa kulutustaan. Tutkimuksen tärkeimmät havainnot ovat, että ilmastonmuutoksen hillitsemishalukkuuden ja asenteen välillä on positiivinen lineaarinen yhteys. Tulokset osoittavat myös, että nuoremmat kuluttajat, naiset ja eteläsuomalaiset kuluttajat ovat halukkaampia muuttamaan kulutustaan.

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1. Introduction

Climate change can be described as one of human history's biggest challenges and we are all needed to curb it. Intergovernmental Panel on Climate Change (IPCC) has set a limit on global warming to 1.5 °C, however, achieving the goal seems to become increasingly ambitious. At this rate, global temperature will rise by 2°C and above in the 21st century if greenhouse gases and carbon dioxide emissions are not reduced significantly in the next decades (IPCC 2022, 129). According to IPCC researchers, human actions are the most dominant reason for climate change and warming (Allen et al. 2018, 53). Governments all over the world have been taking steps towards the goal that temperature would not increase above 1.5 °C. However, if this goal is going to be reached, the private sector needs to also participate, for example, consumers are needed to change their consumption habits (Thøgersen 2021). As 72% of the world's greenhouse gas emissions are produced directly or indirectly by household consumption (Hertwich & Peters 2009).

As a consumer, it can be challenging to regard how your own consumption affects the climate. However, consumers do have an influence in addressing climate change. According to Southerton & Welch (2019) choosing sustainable choices in our consumption does play a key role in the mitigation of climate change. Changing consumers' consumption patterns would make the most significant change. However, reducing consumption and switching products to more environmentally friendly ones are also changes that need to be done (Moran et al. 2020). These changes are things that majorly only high-income consumers can do which is why it makes sense to focus on changing their consumption. Many Finnish consumers belong to this high-income category and that is why it is interesting to study Finnish consumers' consumption habits.

According to Moran et al. (2020), European Union could reduce its carbon footprint by almost 25% if consumers' consumption habits changed to more sustainable. In almost every EU country, including Finland, emissions from consumption increase the carbon footprint more than emissions from production (Liobikienė & Dagiliūtė 2016, 210). This is influenced by many factors, but increased income is one of the main reasons why consumers' carbon footprint is as big as it is (Druckman & Jackson 2016). Finnish households consume energy, products,

and food but also many other products that are not that necessary. Nowadays people are used to consuming commodities and services beyond their needs. According to research by Claudelin et al. (2018), Finnish consumers could save between 3,400-15,000 euros per year by consuming more sustainably, so moving towards sustainable consumption would also benefit the consumers. If we ever want to move to a sustainable future, it is important to understand what factors affect consumer behaviour and what consumers are willing to sacrifice in their consumption.

1.1. Previous research

Consumers' willingness to mitigate climate change has been researched before. Tobler et al. (2012) studied consumers' willingness to act and support policy measures that are addressing climate change. The study found that the costs and perceived climate benefits were the strongest predictors of a willingness to act and support climate actions. Consumers' willingness might change depending on the product e.g., some consumers might be more willing to change their food consumption to something more environmentally friendly yet do not want to switch their driving to public transport. According to Brody et al. (2012) willingness of consumers to join climate change mitigation acts indicates how well consumers are going to obey the new environmental policies once they are adopted. Therefore, understanding behavioral patterns is crucial if local or international environmental policies are going to succeed. Brody et al. (2012) studied whether Americans are willing to alter their behavior to mitigate climate change and found that two thirds of the respondents were willing to change their consumption for the better. The study showed that the risks that come with climate change to the individual and their family are the number one reason for a consumer to change their behavior. The willingness is higher when consumers are more aware of climate change and its risks to consumer's life.

Anti-consumption is one way for consumers to reduce their carbon footprint and be more climate-friendly. Previous research shows that for consumers who avoid consumption, ecological reasons are not as important as social reasons (Sudbury-Riley & Kohlbacher 2018). There has also been research on consumers' willingness to be environmentally friendly, research done by Abdul-Muhmin (2007) shows that willingness to make environmentally friendly decisions depends more on the psychological consequences and not on environmental concerns. Both of the research studies indicate that when consumers are asked to change their consumption, environmental reasons are not as important as other factors.

1.2. Objective and limitations of the study

This thesis studies whether Finnish consumers are willing to change their consumption habits for the benefit of the climate. Changing consumption habits means for example consuming fewer animal products or changing means of transportation for something more environmentally friendly. The subject is current because climate change affects everybody in the world and most western people need to change their consumption to be more environmentally friendly.

This research is limited to only Finnish consumers, therefore the research cannot be generalized to consumers from other nationalities. The research is made from data that was collected from Finnish people in 2019, a current survey interval is chosen to avoid outdated results. The data was collected from 18-70-year-old Finnish people thus it covers most of the adult consumers.

The aim of the thesis is to be achieved through the following main research question:

- *Can Finnish consumers consider changing their consumption habits for the benefit of the climate?*

There are also two sub-questions formed that help to narrow the subject and answer the main research question:

- *According to Finnish consumers, whose responsibility is it to make changes to mitigate climate change?*
- *How demographic factors affect Finnish consumers' willingness to change their consumption*

1.3. Structure of the study

This study consists of five chapters. The first one is the introduction which introduces the topic, and the research questions. The second chapter is the theoretical framework and literature review where the theory behind this study is presented as the conceptual model. In the third chapter research methods and data collection are examined. The results of the research are

presented in the fourth chapter. Finally, in the fifth chapter, the core content of the thesis is reviewed in a summary, the conclusions are presented, and possible needs for further research are discussed.

2. Literature review

This chapter presents previous research on climate change and consumers' willingness to change their consumption patterns. It is necessary to understand that these two main concepts "consumer behavior" and "climate change" are broad concepts and that it is not possible to go through them in dept. This literature review will focus on these topics from the consumers' perspective. At the end of the chapter, the hypotheses and conceptual model are presented.

2.1. Climate change

Earth's climate has always changed over time due to natural fluctuation (Wong 2016), however, Fawzy et al. (2020, 2070) describe, "Climate change is defined as the shift in climate patterns mainly caused by greenhouse gas emissions". Greenhouse emissions are produced by two main sources; natural systems and human activities (Fawzy et al. 2020). Yue and Gao (2018) found that the earth's natural system balances itself out, but human activities are adding extra pressure. This suggests that even though climate fluctuates over time, climate change is mainly caused by human activity.

The world's first climate conference was held in Geneva in 1979 to discuss the effects of climate change (Fawzy et al. 2020) and in 1988 Intergovernmental Panel on Climate Change (IPCC) was created to produce reliable information for governments on climate change (IPCC 2022). Then in 1992, United Nations Framework Convention on Climate Change (UNFCCC) was created. According to Fawzy et al. (2020) since UNFCCC was created it has been the main contributor to advocating in mitigation of climate change. In the twenty-first UNFCCC conference, all participant governments agreed on the Paris agreement (Fawzy et al. 2020) and committed to taking action to mitigate climate change. The Paris agreement was written in 2015 by 196 nations (UNFCCC 2015). The main goal of the Paris agreement is to "Hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels" (UNFCCC 2015, 3).

These international climate-related events can also affect the private sector. Ricci & Banterle (2020) found that the Paris agreement can affect consumers' choices. Their research shows that consumers who do not have a negative attitude toward these kinds of events can be inspired to make some changes in their consumption (Ricci & Banterle 2020). This shows that the public sector's example is something that some people might need to make changes to their consumption.

2.1.1 Mitigation of climate change

Climate change mitigation means reducing greenhouse gas (GHG) emissions and this way preventing the earth's warming (IPCC 2022). The GHG emissions growth rate has been slowing down globally but it is not fast enough, there need to be more ambitious actions, so that the temperature rise stays below 2°C above pre-industrial levels (IPCC 2022). Moving towards a better future depends on new policies, technologies, and the energy sector. The use of fossil fuels must be reduced, and instead, use renewable energy sources for reducing GHG emissions.

However, reducing GHG emissions is not cheap and there is a discussion about the economical disadvantages (VijayaVenkataRaman et al. 2012). Developed countries are moving towards cutting their GHG emissions e.g., by switching from non-renewable to renewable energy sources. However, according to VijayaVenkataRaman et al. (2012), developing countries' GHG emissions are going to increase in the future due to economic development needs. Because of this it is even more important that developed countries reduce their GHG emissions and give room for developing countries to reach the same standard of living. There are multiple ways to reduce GHG emissions from the atmosphere, but this study is going to focus on what mitigation actions consumers can make.

Green consumption has been seen as a solution to climate change e.g., Girod et al. (2014) studied that there is a substantial effect on the climate if consumers would change their consumption to greener. Green consumption means consuming products that generally have low energy consumption and release fewer CO2 emissions than other products in the same product category (Alfredsson 2004). However, Alfredsson (2004) studied that adopting green consumption habits will not make a difference if consumption patterns and habits do not

change. The study was done on Swedish consumers and as Finland and Sweden are similar countries the study can be parallel to Finnish consumers also. The research showed that the best way for consumers to mitigate climate change is to change their consumption patterns. This means that our culture should also change so that buying new things would not be the norm.

2.2. Consumer behavior

In the 1950s companies started to realize that it is better to focus on the consumer than just on the sales, so companies started to move from sales to focus on marketing. With marketing came the consumer behavior concept (Schiffman & Kanuk 2010, 26). Schiffman & Kanuk (2010) defined consumer behavior as how consumers search, purchase, use, and evaluate products and services. Consumer behavior studies how consumers, individuals, or households decide to use their resources and what they decide to buy, and why (Schiffman & Kanuk 2010). Even though everyone is a unique consumer they form a mass that play an important role in the economy. Purchasing decisions affect every part of businesses and consumers' behavior will be the reason why some businesses succeed or fail. (Schiffman & Kanuk 2010, 23)

According to Schiffman & Kanuk (2010), there are two types of consumers: personal and organizational. This study focuses on personal consumers, who usually buy products or services for their own use. Personal consumers' everyday consumption is led by routines, money, social norms, and comfort, and changing these already-established consumption patterns is difficult (Vermeir & Verbeke 2006). The problem in our consumption patterns is that nowadays consumers have started to consume means over their needs or started to overconsume. The consumption patterns have become unsustainable and impossible environmentally to keep up with them (Assadourian 2010), therefore they are needed to change if we want to provide the earth livable to future generations. As climate change has increased global awareness many companies have realized that some consumers appreciate reusable and eco-friendly products. Companies have started green marketing to attract more consumers to buy their products (Schiffman & Kanuk 2010). Companies can offer sustainable products, however, in the end the choice of what to buy is the consumers'. If consumers want to consume eco-friendly products companies will offer them to the market because they seek to profit.

2.2.1 Theory of planned behavior

In behavioral research, the theory of planned behavior (TPB) by Icek Ajzen (1991) is one of the most used models of human behavior. With the help of TPB consumers' future behavior can be predicted based on their behavioral intentions which are impacted by attitude and subjective norms. The theory of planned behavior is presented in Figure 1:

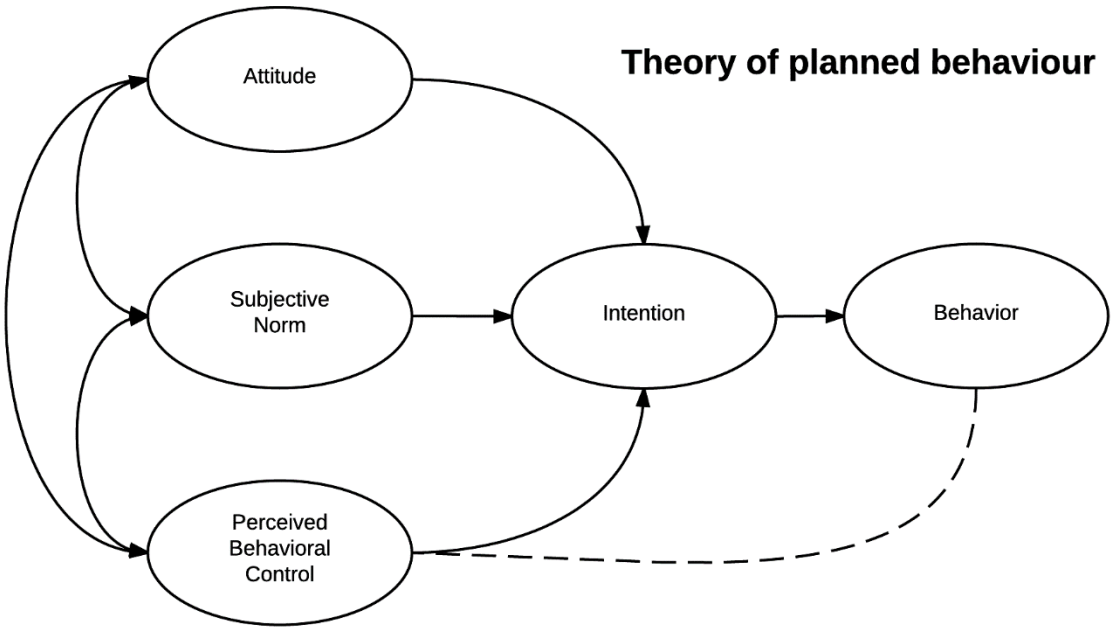

Figure 1. Theory of planned behavior. (Ajzen 1991)

The theory of planned behavior presents three factors that affect behavioral intention: attitude toward the behavior, subjective norm, and perceived behavioral control. These three factors can impact each other depending on the situation. The theory of planned behavior was chosen for this study because it helps to understand consumer behavior and other researchers have used it in similar studies. For example, Valle et al. (2005) used the TPB with elements from other models to study individuals' recycling involvement. Grob (1995) also invented a model of environmental behavior that has similar factors to Ajzen's model and found that perceived control, environmental knowledge, and personal values, were factors that determined environmental behavior. In this chapter Ajzen's model is examined in this study's context; are Finnish consumers willing to change their consumption to mitigate climate change?

2.2.1.1 Attitudes

Even though climate change is increasingly reported, and scientists have confirmed the phenomenon is real, some people still feel uncertain about it. Nowadays information about climate change is easily available, however, skepticism in consumers' attitudes towards climate change is a barrier to personal engagement in mitigating climate change (Corner et al. 2012). Past research by Lorenzoni et al. (2007) shows that the main obstacle to personal commitment is a lack of basic knowledge e.g., reasons, effects, and solutions about climate change. The researchers discussed that lack of knowledge might cause a feeling of doubt about climate change which can lead to not believing the reality of climate change and human influence on it. Research done by Yilmaz & Can (2018) shows that when the level of knowledge about climate change increases concern and awareness also increase. The lack of knowledge can affect people's attitudes toward climate acts and supporting climate policies.

Since this study focuses on Finnish consumers, it was important to also research studies that only concern Finnish consumers. Lorenzoni & Pidgeon (2006) found that Finnish consumers do feel worried about climate change, approximately 25% of Finnish people answered "very worried" to a questionnaire according to climate change, and altogether 53% were generally worried about climate change. However, the correlation between environmental concerns and environmental acts is not very strong. Bamberg & Möser (2007) found that environmental attitudes and environmental actions do only have moderate correlations. This is because individuals might feel that their actions do not matter as climate change is a global problem. Research shows that most people from developed countries feel that climate change is a distant threat and does not impact them (Wolf & Moser 2011). Lorenzoni & Pidgeon (2006) also found that even though climate change concerns individuals it is not viewed as important as other social, environmental, and personal issues. However, need to be remembered that these studies are from years ago therefore consumers' opinions might have changed since climate-related issues have been on the news more.

2.2.1.2 Perceived behavioral control

Perceived behavioral control (PBC) means how difficult or easy is the behavior to perform to a consumer (Ajzen 1991). In the context of mitigating climate change, PBC is dependent on

the customers' recourses. For example, does the customer have the time and money to change their consumption to mitigate climate change? Some mitigating actions require financial investment such as switching from a combustion engine car to an electric car. However, most mitigating actions require reducing consumption which can benefit the consumer financially. Even if a consumer has all the resources available, changing consumption patterns is difficult as changing any patterns that an individual is used to.

2.2.1.3 Subjective norms

The subjective norms mean the social pressure to act in a certain way (Ajzen 1991). Social pressure can come from family and friends and mitigating acts might be done to improve individuals' own social image. However, this depends on the individuals' social circle, are the people around them trying to live a sustainable lifestyle, or do they highly regard an overconsumption lifestyle? New research shows that peer pressure and social norms have become more influential factors in consumers' consumption decisions (Stoknes 2014) and that is why consumers do not always go for the cheapest option. Stoknes (2014) suggested that policymakers should utilize this social pressure that social norms create by making new policies that encourage a sustainable lifestyle.

However, even with new policies, it is the consumer culture that needs to change. In western cultures, social norms encourage consumers to spend and live carbon-intensive lifestyles. According to Steentjes et al. 2017; Gifford 2011, current social norms in the west are more likely to damage sustainable action and encourage unsustainable consumption.

2.3. Consumers and climate change

Girod et al. (2014) studied that changes in consumer consumption have the potential to mitigate climate change. IPCC 2014 report also recognized that changing consumer behavior and consumption patterns are part of climate acts to cut emissions. 72% of the world's greenhouse gas emissions come from household consumption (Hertwich & Peters 2009). However, all consumers do not produce the same number of emissions. Dabi et al. (2022) studied that 50% of the world's carbon dioxide emissions are produced by the 500 million richest people and 6% comes from the poorest 3 billion. For every consumer higher income does not always mean

higher consumption however generally there is a connection between them. Ivanova et al. (2016) found that income level explains 29% of the produced consumption-based carbon footprints (CBCFs).

According to research by Claudelin et al. (2018), average Finnish households could mitigate climate change with just small changes in the year resulting in households producing approximately 2085 kgCO2e fewer emissions annually. Making these changes would also benefit the consumer, the average household could save approximately 3445 euros annually. In another scenario where consumers needed to make great changes, they could save 15224 euros annually, and reduce GHG emissions by 9439 kgCO2e. These savings depend on the household's income. Higher income households do have more where to cut than smaller-income households which already spend the majority of their income on necessities. This research shows that Finnish consumers can mitigate climate change however it does not study whether they are willing to do these changes.

Currently, consumers have multiple ways to mitigate climate change, from buying more environmentally friendly food to deciding what generates their electricity. Chancing consumption patterns sounds relatively easy, however, Andrews et al. (2022) studied that consumers who have been presented with multiple mitigation behavior suggestions can get too overwhelmed and not carry out any of them in their daily life. If only a few mitigation behaviors were presented to consumers, they were more likely to implement those few suggestions. It can be concluded that too many choices between "good" and "bad" products confuse consumers, the solution to this problem could be new policies that would encourage consumers to the good choices. In addition, that consumers can mitigate climate change by changing their consumption patterns and behavior, they are also citizens and voters, who decide whom they want to vote for to make policies that can impact the environment. If consumers are interested and vocal about new climate policies policymakers would be more pressured.

2.4. Conceptual model and research hypotheses

The study's conceptual model is presented in Figure 2:

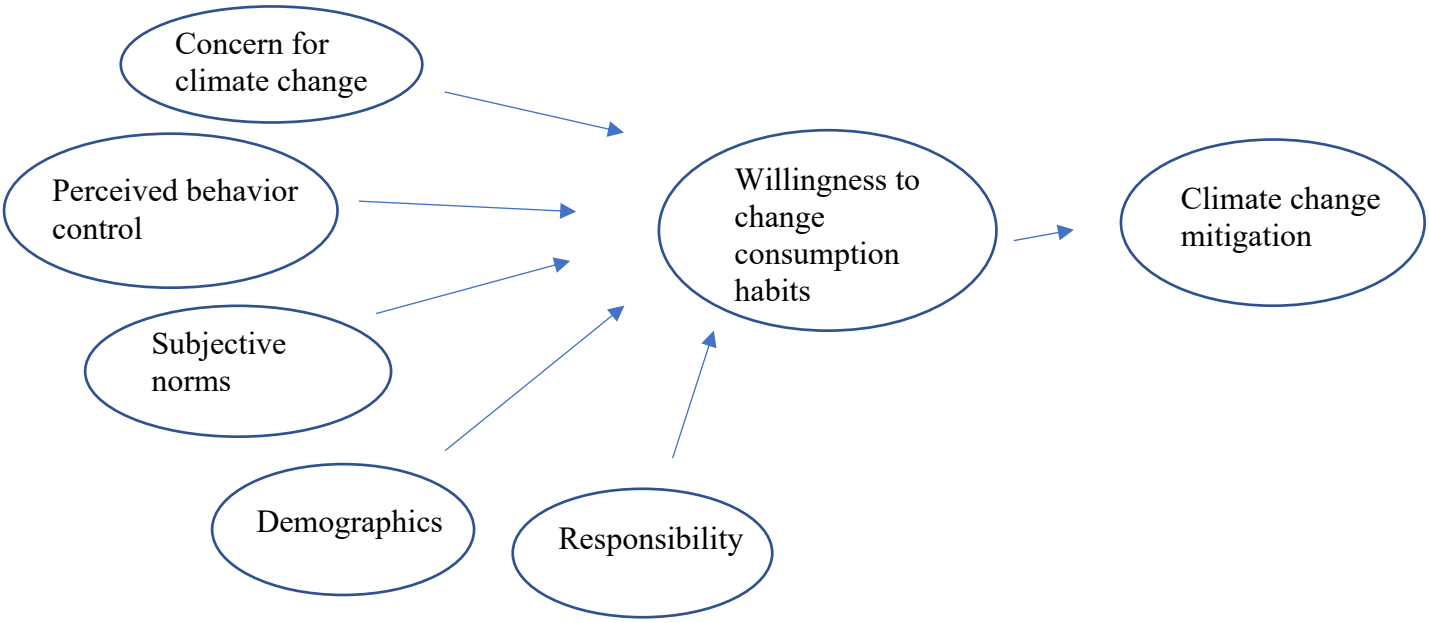

Figure 2. Conceptual model

There have been studies on how climate concern affects the willingness to do climate mitigating acts. Kolenatý et al. (2022) studied students' willingness to mitigate climate change and found that sufficient information raises climate concerns which leads to a willingness to act. Milfont (2012) found also that when consumers have the right knowledge it increases concern, and this leads to greater personal involvement and actions. Ajzen's (1991) theory of planned behavior also highlights the attitudes towards the behavior and concern can be considered as an attitude. Therefore, following Ajzen's (1991) TPB theory, Kolenatý et al's. (2022) and Milfont's (2012) studies, the first hypothesis is:

H1: Environmental concern positively affects consumers' willingness to change their consumption.

Perceived behavior control is part of Ajzen's (1991) TPB theory, and it explains how difficult or easy the behavior is to perform. The more difficult the behavior is to perform the more likely consumers will not do it. Tobler et al. (2012) studied determinants of consumers' willingness to act and support policy measures. Their study showed that mitigation actions that seem more difficult to adapt are more likely not to be performed. Based on this the second hypothesis is:

H2: If the consumer sees mitigating climate change as difficult, it will negatively affect the consumer's willingness to change their consumption.

The third and final factor of Ajzen's (1991) TPB theory is that behavioral intention is affected by subjective norms. Subjective norms mean the social pressure that an individual's social circle creates. If other consumers are making mitigation acts it pressures the individual to also do them, therefore the third hypothesis is:

H3: The consumer is willing to change their consumption if other consumers also make changes.

Some consumers feel that their actions do not matter, and policymakers are the ones who should take responsibility to mitigate climate change. Therefore, the fourth hypothesis is:

H4: If consumers think that policymakers should mitigate climate change, it negatively affects their willingness to change their consumption.

Lastly, the demographics will be examined which will help to answer the main research question. Therefore, the fifth hypothesis is:

H5: Demographics affect consumers' willingness to change their consumption.

Hypotheses H1, H2, and H3 answer the main question *"Can Finnish consumers consider changing their consumption habits for the benefit of the climate?"*. H4 answers the question *"According to Finnish consumers, whose responsibility is it to make changes to curb climate*

change?". H5 answer the final question *"How do demographic factors affect Finnish consumers' willingness to change their consumption"*.

3. Methodology

This chapter presents dependent variables, independent variables, the used data, and research methods. The method chosen for this study is quantitative and the research uses a 5% risk level.

3.1. Description of the data

The analyses of the thesis are based on the data that was planned by Finnish Business and Policy Forum (EVA) and collected by Finnish Taloustutkimus, which is a company that implements commercial surveys. EVA is the Finnish Business and Policy Forum that aims to support the success of Finnish society (EVA 2022). EVA has done surveys to study Finnish values and attitudes since 1984, however, this thesis focuses on the data that was collected in the spring of 2019 from the 18–70-year-old Finnish population. The year 2019 was chosen because it is the newest data that was collected.

There were 2059 respondents, and they filled out a web-based self-administered questionnaire. The sampling technique was multiphase sampling. Survey respondents were chosen from Business research's online panel according to respondents' age, gender, place of residence, education, and occupation/position to present the Finnish population. The business research's online panel is a group of citizens between the ages of 15 and 79 selected by random sampling from the Finnish population. When registering for the panel the panelists provided their demographic and sociographic background information and agreed that Taloustutkimus may invite them to different market surveys. Responding to a survey is voluntary for the panelists, and they can leave the panel at any time. The survey was carried out with a Likert scale questionnaire. The panelists answered from options 1 to 5, number one being completely agreeing and number five being completely disagreeing. However, in this research, for better interpretation, the answer options were decided to turn the other way around. The response rate of this data is 23.3%.

In this thesis, one of the research questions is studying how demographic factors affect Finnish consumers' willingness to change their consumption. Therefore, the demographic factors are closely presented in this study. According to Masud et al. (2017), demographic factors can have a huge impact on individuals' awareness of environmental issues, climate change, and attitudes, therefore they also affect consumers' willingness to mitigate climate change. The chosen demographics that are studied are *age, gender, place of residence,* and *education* These factors were chosen because there are previous studies on how these demographic factors affect environmental concern, and therefore willingness to mitigate climate change (Diamantopoulos et al. 2003).

Demographic factors play an important role in this study therefore they are carefully reviewed. As seen in Figure 3. 56 years old and over were the largest group of respondents and 18-35-year-olds were the smallest group of respondents. However, the gender distribution between males and females is quite even. Almost half of the respondents have vocational education and the next largest group 35.7% have got a university degree for their education. It was chosen that respondents were divided for their place of residence for Southern Finland and Northern Finland. Southern Finland is formed of five provinces and almost 55% of the panelist are from there, 46% of the panelist are from Northern Finland.

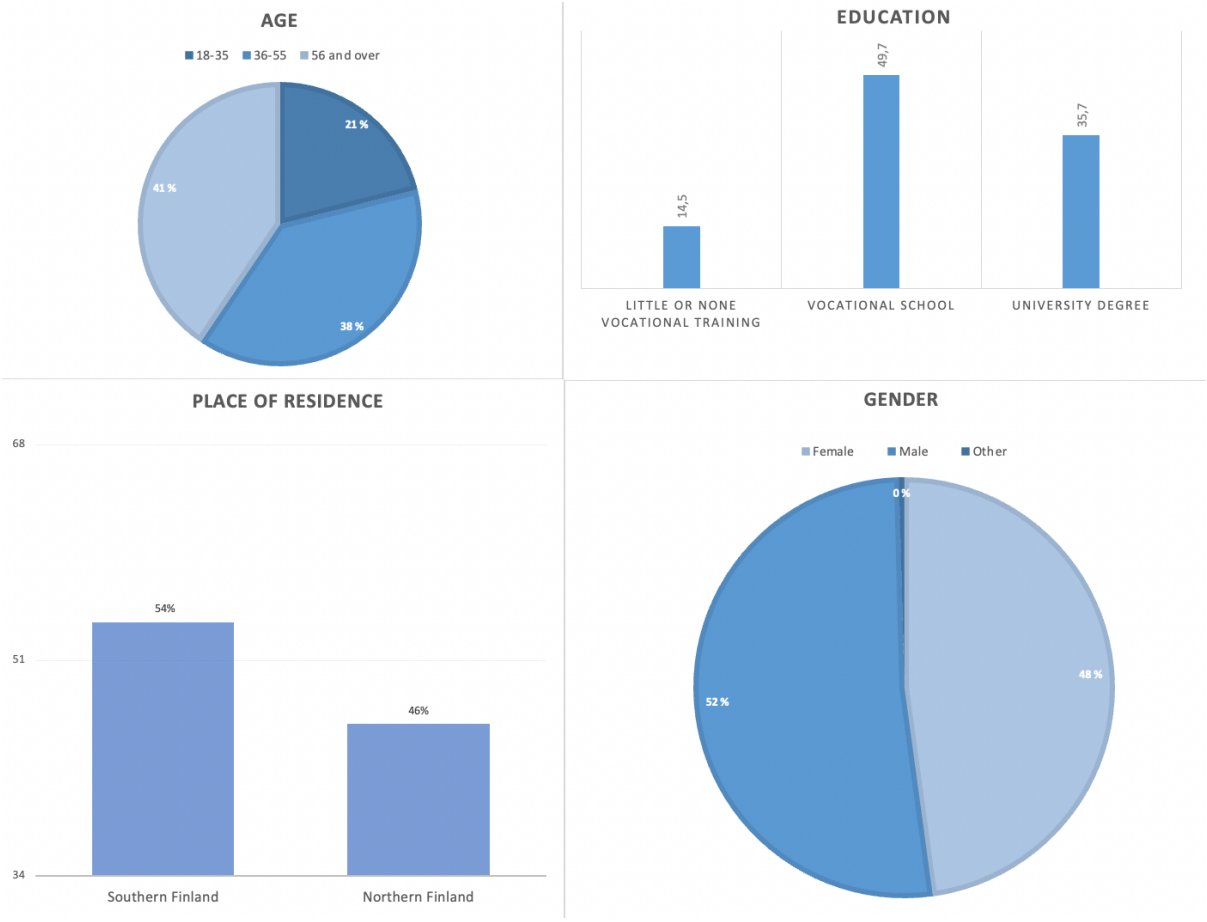

Figure 3. Demographic factors

3.2. Variables

This chapter presents how the variables used in the study have been created and on what questions they are based. One sum variable that presents the willingness to mitigate climate change is created. The independent and dependent variables are presented in this chapter also. The answers were originally from 1 to 5, one being completely agreeing and five completely disagreeing. For better interpretation, the answer options were decided to be turned the other way around for this study. Therefore, for this study, option one is completely disagreeing, and option five is completely agreeing.

3.2.1 Independent variables

The examination of the variables started with studying each one of the variable's mean and standard deviation, these are shown in Table 1. There are four independent variables that are used to explain the dependent sum variable. In Appendix 1 the independent variables' distributions are presented graphically and with the help of the Shapiro-Francia normal

distribution test. The variable *climate change threat* was formed from the question "Climate change is the biggest environmental threat of our time, and effective measures must be taken as quickly as possible to combat it". Variable *subjective norms* was created from the question "I would be ready to take climate action if I could be sure that other citizens would also take action". The third independent variable *feeling powerless* was created from the question "There is so much vague information about climate change and the means by which it can be affected that it is difficult to know what effect one's own actions will have". The last independent variable *responsibility* was created from the question "Policymakers must make the necessary solutions and actions to slow down climate change, and they cannot be placed on the responsibility of individual citizens". According to the statistical tests, none of the variables are normally distributed.

Variable	Obs	Min	Max
Subjective norms	2059	1	5
Climate change threat	2059	1	5
Feeling powerless	2059	1	5
Responsibility	2059	1	5

Table 1. Description of the independent variables

3.2.2 Dependent variables

In the questionnaire, panelists are asked a series of questions about how possible they think it is to implement climate actions in their current life situation. There are nine questions in the series and summing all the nine statements together formed a sum variable that represents the willingness to mitigate. In Table 2 is presented questions where the dependent variable *Mitigation* was formed.

Q5_1	How possible do you think it is to implement the following climate actions in your current life situation: Giving up eating meat?
Q5_2	How possible do you consider the implementation of the following climate actions in your current life situation: Ending private driving?
Q5_3	How possible do you consider the implementation of the following climate actions in your current life situation: Transition to the use of completely renewable energy in the household?
Q5_4	How possible do you consider the implementation of the following climate actions in your current life situation: Giving up air travel?
Q5_5	How possible do you consider the implementation of the following climate actions in your current life situation: Halving the consumption of personal goods (e.g. clothes)?
Q5_6	How possible do you think it is to implement the following climate actions in your current life situation: Giving up a gasoline- or diesel-powered car?
Q5_7	How possible do you think it is to implement the following climate measures in your current life situation: Full reimbursement of air travel emissions with additional fees?
Q5_8	How possible do you think it is to implement the following climate measures in your current life situation: Reducing energy use in the household (e.g. lowering the room temperature)?
Q5_9	How possible do you consider the implementation of the following climate actions in your current life situation: Stopping the use of dairy products?

Table 2. Questions where the dependent variable was formed

Cronbach's alpha measures the reliability of the sum variable, under 0.60 alphas are not considered to be reliable (Metsämuuronen 2002, 118). The *mitigation* sum variable's Cronbach's alpha is 0.803 which is considered good. This sum variable is going to be used to compare with the other variables. The dependent variable is presented in Table 3.

Variable	Mean	Obs	Min	Max	Cronbach's alpha
Mitigation	3.188	2059	1	5	.803

Table 3. Description of the dependent variable

The normal distribution of the dependent variable is examined graphically and with a statistical test. Shapiro-Francia statistical test shows that the variable is not normally distributed. Results of the normal distribution test and the sum variable's Cronbach's alpha are presented in Appendix 2.

3.2.3 Control variables

Demographic factors are used as control variables to study the dependent variables. The chosen demographic factors are age, gender, place of residence, and education. The age variable is divided into three different groups: 18-35 years old, 36-55 years old, and over 56-year-olds. There were three different genders, female, male, and other. Three of the respondents who listed their gender as other were excluded from further analyses. The place of residence variable is divided between Finland, Southern Finland, and Northern Finland. The education variable is divided into three different education levels: little to no vocational training, vocational training, and to a university degree. Variables have been examined in Table 4.

Variable	Obs	Min	Max
Gender	2059	1	3
Residence	2059	1	2
Age	2059	1	3
Education	2059	1	3

Table 4. Description of the control variables

3.3. Analyses

The research method chosen for this study is quantitative. The linear regression analyses are executed with Stata/SE 17.0 -program. The ordinary least squares (OLS) was used as the estimation method. It minimizes the squares of the distance between the observations and the regression line (Basu 2014).

3.3.1 Multivariate linear regression

Before doing the linear regression test, initial reviews were made for the variables. The connection of each independent variable with the dependent variable was examined with bivariate tests. The variables are not normally distributed, therefore the chosen test is Spearman's correlation test. Results can be seen in Appendix 3.

The correlation test shows that the p-value is below the selected risk level (.05) for all the chosen variables. This indicates that the chosen variables have an impact on consumers'

willingness to mitigate climate change. Three of the variables have a negative correlation coefficient, age (-.14), feeling powerless (-.30), and place of residence (-.09), however, the rest of the variables have a positive correlation. These correlations are quite weak therefore the connections are examined more carefully with the linear regression analysis.

Linear regression analysis is a method that aims to predict the values of the dependent variable by variation of the values of the independent variable. In the multivariate linear regression, the dependent variable that the other variables are compared to is the sum variable *mitigation* which means the consumers' willingness to mitigate climate change. Linear regression has presumptions that are needed to review before executing regression analysis. There are seven assumptions for linear regression, which are called Gauss-Markov assumptions (Kaakinen & Ellonen 2022). The first assumption is that the independent variables should be continuous variables. However, there can be exceptions to this if there are many observations in the material (Kaakinen & Ellonen 2022).

The first linear regression aims to find a connection between consumers' willingness to change consumption and subjective norms, the concern about climate change, perceived behavior control, and responsibility. The dependent variable is *mitigation* and the independent are variables *subjective_norms, climatechange_concern, feeling_powerless,* and *responsibility*. With this test first four hypotheses should be answered and therefore the first two research questions are answered.

The background assumptions of the model are examined in Appendix 4. The next assumptions for linear regression analysis are linearity and specification. A statistical test showed that specification could be better if there would be more variables, however graphically it looks like the connections are linear. The fourth assumption is homoscedasticity, meaning that the error term's variance must be constant. The model is heteroskedastic therefore the analysis is made again, and the corrected standard errors are removed. The fifth presumption is multicollinearity, meaning that the variables are correlating too much among themselves, from Appendix 4 it can be seen that multicollinearity is not a problem. The last assumptions are related to the residual's normal distribution and independence. As can be seen in Appendix 4, residuals are normally distributed and independent.

The second linear regression examines how demographic factors affect the willingness to mitigate. The test is done between the dependent variable *mitigation* and independent demographic variables *age, gender place of residence,* and *education* which are used as control variables. The same pre-assumptions are inspected for this test as for the previous one. These can be seen in Appendix 5. First, it is examined if the model is correctly specified with Ramsey reset test. The test showed that the model is correctly specified. Next, the linear connection between the dependent variable and control variables is examined. Graphically it looks like there is a linear connection. Homoscedasticity is one of the requirements for linear regression. The model is homoscedastic, therefore it does not need to be adjusted. Residuals' independence from the dependent variable is examined and, as can be seen from Appendix 5, there is no clear dependence between them. Multicollinearity means that the dependent variables correlate strongly among themselves, in this model, there is no multicollinearity. The last presumption is residuals' normal distribution and independence. A statistical test showed that residuals are not normally distributed, however it will not be a problem because graphically they seem to be normally distributed.

4. Results

In this chapter, the empirics of the research are discussed, and the results of the regression analysis are presented. The research questions are answered, and decisions are made about whether research hypotheses are supported or rejected.

In Table 5 the first two linear regression variables' p-values, R-squares, regression coefficients, and the number of respondents are collected. The first analysis R-squared is 30.8% which is a reasonably good result, and model 2 has a 10.7% R-squared which is acceptable. R-squared shows how well the data does fit in the linear regression model. As can be seen from Table 5, both models are statistically significant with a p-value under the risk level (0.05). However, the connection between some of the independent variables with the dependent ones is not statistically significant. In model 1, all the independent variables have a statically significant connection with the dependent variable. In model 2, the independent variable *Education* does not have a statistically significant connection as its p-values are .612 and .021 which are above the chosen risk level (0.05). All the statically significant p-values are marked with a star. The starting value for the control variable *age* is *18-35* and other age groups are compared to it. In

the control variable *gender, male* is the base value that *women* are compared to. In the control variable *residence*, variable *Southern Finland* is the base variable and *Northern Finland* variable is compared to it. In the control variable *education,* the base variable is *little to no vocational training* and other variables are compared to it.

	Model 1	Model 2	p-value	Mean	Std. dev.
Climate change threat	.287		.000*	3.525	1.151
Subjective norms	.063		.000*	4.010	1.168
Feeling powerless	-.127		.000*	3.235	1.238
Responsibility	.047		.009*	3.805	1.064
Age				2.196	.764
18-35					
36-55		-.268	.000*		
56 and over		-.248	.000*		
Gender				1.487	.509
Men					
Women		.402	.000*		
Residence				1.462	.499
Southern Finland					
Northern Finland		-.139	.000*		
Education				2.213	.676
little to no vocational training					
Vocational school		-.027	.612		
University degree		.127	.021		
N	2059	2059			
R-squared	.308	.107			
F	35.21	211.24			
Prob>F	.000	.000			

Table 5. Linear regression results of the first and second analysis

4.2. First linear regression

In the first model, the sum variable *mitigation* was tested with four independent variables, the first was *climate change threat*, which indicated how big of a threat consumers saw climate change as. The results show that if an individual thinks that climate change is a threat, they are more willing to do mitigation actions. The result is consistent, if an individual thinks something is a threat, they are ready to act so that the threat does not realize. Results are in line with previous research, Bamberg & Möser (2007) also found in their studies that there is a correlation between environmental concerns and environmental acts, however, the correlation is not very strong. The hypothesis for this test was H1*: Environmental concern positively*

affects consumers' willingness to change their consumption. Due to this result, hypothesis 1 is supported.

The results show that if consumers feel that there is too much information about climate change and how consumers can mitigate it, they are more likely to not perform mitigation acts. This can be seen from the negative regression coefficient that is between mitigation and *feeling powerless* variables. The hypothesis for this test was H2*: If the consumer sees mitigating climate change as difficult, it will negatively affect the consumer's willingness to change their own consumption.* Due to this result, hypothesis 2 is supported.

The effect of subjective norms on willingness to mitigate is moderate though they still have a positive correlation. This means that even though some consumers might feel that they would need social pressure to do mitigation acts they are still ready to do the actions themselves without other consumers' pressure. The hypothesis for this test was H3*: The consumer is willing to change their consumption if other consumers also make changes.* Due to this result, hypothesis 3 is supported.

Surprisingly, between variable *responsibility* and *mitigation*, there is a positive regression coefficient. This means that if consumers feel that it is the policymakers' responsibility to do mitigation actions, consumers still are ready to do the mitigation actions themselves also. The regression coefficient is moderate yet still positive. The hypothesis for this test was H4: *Consumers who think that policymakers should mitigate climate change, negatively affect their willingness to change their consumption.* Due to this result, Hypothesis 4 is rejected.

In Appendix 5, beta coefficients, which tell how susceptible the dependent variable is to a change to the independent variable, are presented. In the first test *mitigation* is the most affected by *climate change threat* and secondly affected by *feeling powerless.*

4.3. Second linear regression

In model 2, demographic factors; connection to a willingness to mitigate climate change were reviewed. The chosen factors were age, gender, place of residence, and education. All other variables were statically significant except education. Results show that an individual's educational background does not have a significant connection to the willingness to mitigate.

This is an interesting result as many researchers indicate that knowledge raises awareness which usually leads to action (Yilmaz & Can 2018; Milfont 2012).

Age had a statically significant connection to the mitigation sum variable. Results show that younger consumers are more willing to do mitigation acts in their life. Between 36-55 and 56 and over there is not a great difference in willingness to mitigate climate change. This result is in line with previous research. According to McGlone et al. (2011) young adults have a high tendency to engage in environmentally friendly consumption and therefore generally they are more interested in doing mitigation acts. This might be because climate change's threats are realized in their lifetime unlike during the lifetime of older generations.

Results also show that women are more willing to do mitigation acts than men. Place of residence also has an impact on whether individuals are ready to make mitigation actions. Consumers who live in Southern Finland seem to be more willing to do mitigation actions than consumers who live in Northern Finland. This might be because a few of the questions on where the *mitigation* sum variable was formed were related to private driving and giving up your car or changing it to an electric car and it is well known that in Finland public transportation is quite weak outside big cities.

More details from the regression analysis can be seen in Appendix 7, where beta coefficients i.e., standardized regression coefficients tell how prone the dependent variable is to a change in the independent variable. In the second linear regression analysis *willingness to mitigate* is affected mostly by gender and then age.

Table 6 presents research questions, hypotheses, and results whether the hypotheses are supported or not. As can be seen from the figure, four of the hypotheses are supported and one is not.

Research question	Hypothesis	Result
Can Finnish consumers consider changing their consumption habits for the benefit of the climate?	*H1: environmental concern positively affects consumers' willingness to change their consumption*	**Supported**
	H2: if the consumer sees mitigating climate change as difficult, it will negatively affect the consumer's willingness to change their own consumption.	**Supported**
	H3: The consumer is willing to change their consumption if other consumers also make changes.	**Supported**
According to Finnish consumers, whose responsibility is it to make changes to curb climate change?	*H4: If consumers think that policymakers should mitigate climate change, it negatively affects their willingness to change their consumption.*	Not supported
How do demographic factors affect Finnish consumers' willingness to change their consumption?	*H5: Demographics affect consumers' willingness to change their consumption.*	**Supported**

Table 6. Research questions, hypotheses, and results

5. Conclusions

The purpose of this chapter is to summarize the main findings and results of the thesis and answer the research questions. In the last subsection of this study, the reliability of the research is evaluated and possible topics for further research are discussed.

5.2. Research results and summary

This research studied whether Finnish consumers are willing to change their consumption to mitigate climate change. Ajzen's (1991) theory of planned behavior was used as a model theory for the research, and the conceptual model was based on Ajzen's theory. The data that this research was based on was planned by Finnish Business and Policy Forum EVA and collected by Taloustutkimus. The data was a part of a survey that studies Finnish values and attitudes, the chosen survey was collected in 2019.

There were three research questions, one main question, and two sub-questions that assisted in answering the main question. Five hypotheses were made from the research questions; four were supported and one was not. To answer the research questions, two linear regression analyses were made. For both linear regression analyses, the pre-assumptions are mainly correct. As linear regression analysis, reliability depends on whether pre-assumptions are correct therefore it can be said that both models are reliable. All the independent variables' connections to dependent variables were statistically significant except the education variables' connection to the willingness to mitigate climate change.

This research utilized Ajzen's (1991) theory of planned behavior (TPB) as a base theory, and the research's conceptual model was based on Ajzen's theory. In this research, attitude toward a willingness to mitigate climate change was measured with how big a threat consumers felt that climate change is. Subjective norms were measured with the claim that if other consumers are making mitigation acts it pressures the individual to also do them. Perceived behavior control (PBC) was measured with the claim that if the consumers feel mitigating climate change is difficult, it will negatively affect the consumers' willingness to change their own consumption. In addition to these three factors also the effect of demographics and feeling powerless were studied. The results show that attitude and subjective norms have a positive effect on the willingness to mitigate. However, perceived behavioral control has a negative impact on the willingness to mitigate. The results show that as environmental concern grows, the consumers' willingness to change their consumption also grows, and the more powerless the consumers feel the more unwilling they are to change their consumption.

Demographic factors were studied with one hypothesis. The results show that the younger the consumers are the more willing they are to change their consumption. The result is in line with McGlone et al.'s (2011) research. Education, however, did not have a statistically significant connection to the willingness to change consumption. The result is surprising because many researchers have found that knowledge usually raises awareness of climate change which usually leads to mitigation actions (Yilmaz & Can 2018; Milfont 2012). It was also investigated how a place of residence affects willingness to change consumption. Results show that consumers who live in Southern Finland were more willing to change their consumption than consumers who live in Northern Finland.

The effect of gender on willingness to change consumption was studied and the results show women were more willing to change their consumption than men. After interpreting the results, the following answers to the research questions were concluded:

"*Can Finnish consumers consider changing their consumption habits for the benefit of the climate?"*

"Yes, they can."

"According to Finnish consumers, whose responsibility is it to make changes to curb climate change?"

"Finnish consumers think that it is policymakers' responsibility to make changes to curb climate change, however, they are also willing to make changes themselves."

"How do demographic factors affect Finnish consumers' willingness to change their consumption?"

"Results show that younger women are more willing to change their consumption for the benefit of the climate than men, place of residence also impacted the willingness."

5.3. Research reliability, limitations, and further research proposals

The results of this research are expected to be reliable as the research process was carefully conducted. The data was collected by Taloustutkimus, therefore, it can be trusted that the data represents the Finnish population correctly. The business research's online panel chooses Finnish consumers according to their demographic factors so that the sample would represent the Finnish population as well as possible. The sample size was 2059, therefore, it can be trusted that the results present the Finnish population and are reliable.

This research studied whether consumers are *willing to change* their consumption and not whether are they *going to change* their behavior. Future research could be focused on how willingness turns into behavior and how well willingness can predict final behavior. It would be interesting to know more in detail about what factors affect willingness, and why younger consumers, consumers who live in Southern Finland, and women are more willing to change

their consumption to mitigate climate change. For example, do these consumer groups have more resources to change their consumption?

The result shows that attitude towards climate change has a moderate connection, therefore, policymakers and companies should utilize it. Companies that produce environmentally friendly products should market their products to consumers who think climate change is a threat because they are more willing to make changes to their consumption. Policymakers could inform citizens about climate change more so that their attitude towards it would change.

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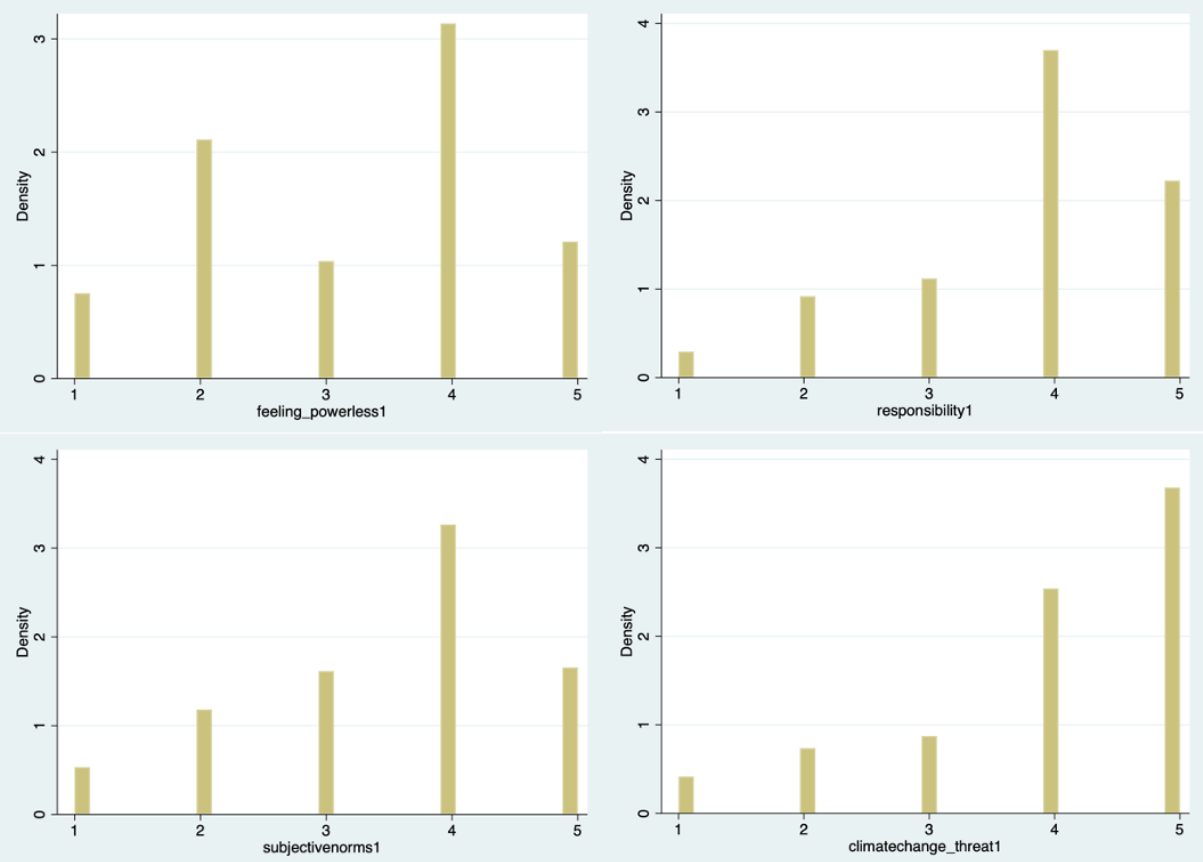
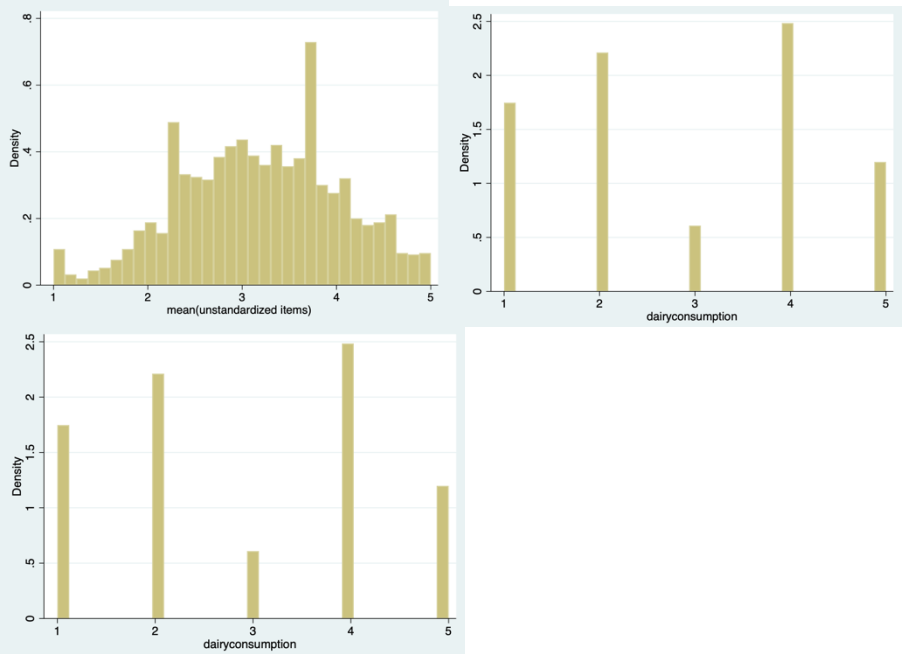
Appendix 1. Independent variables' normal distributions



Shapiro–Francia W' test for normal data

Variable	Obs	W'	V'	z	Prob>z
subjective~s	2,059	0.98485	19.534	7.129	0.00001
climatecha~t	2,059	0.96658	43.103	9.027	0.00001
feeling_po~s	2,059	0.98067	24.922	7.713	0.00001
responsibi~y	2,059	0.97545	31.662	8.287	0.00001

Appendix 2. Dependent variables' normal distributions



Variable	Obs	W'	V'	z	Prob>z
meat_consu~n	2,059	0.97645	30.366	8.187	0.00001
dairyconsu~n	2,059	0.97680	29.912	8.151	0.00001
mitigation	2,059	0.99446	7.139	4.715	0.00001

Sum variables alpha

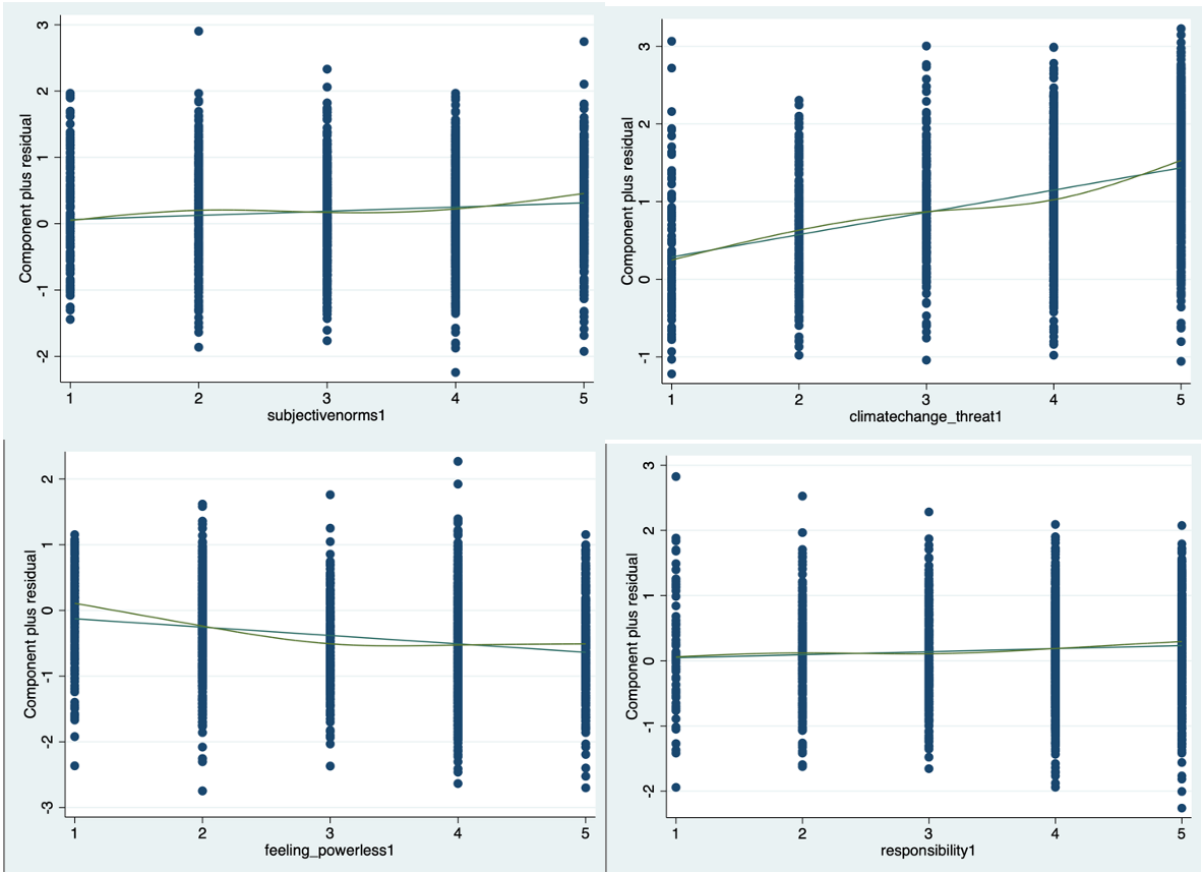
```
Test scale = mean(unstandardized items)

Average interitem covariance:     .5631968
Number of items in the scale:            9
Scale reliability coefficient:      0.8027
```

Appendix 3. Correlation tests

	Spearman		
	Variable	Sperman's rho	p
The dependent variable	**Mitigation**		
	Age	-.137	.000
	Gender	.271	.000
	Place of residence	-.087	.000
	Education	.096	.000
	climatechange threat	.519	.000
	Feeling powerless	-.301	.000
	Responsibility	.268	.000
	Subjective norms	.295	.000
The dependent variable	**Meat consumption**		
	Gender	.295	.000
The dependent variable	**Dairy cosnumption**		
	Gender	.147	.000

Appendix 4. Background assumptions of the first model

Linear connection



Specification

```
Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of mitigation

H0: Model has no omitted variables

F(3, 2051) =  11.38
  Prob > F = 0.0000
```

Homoscedasticity

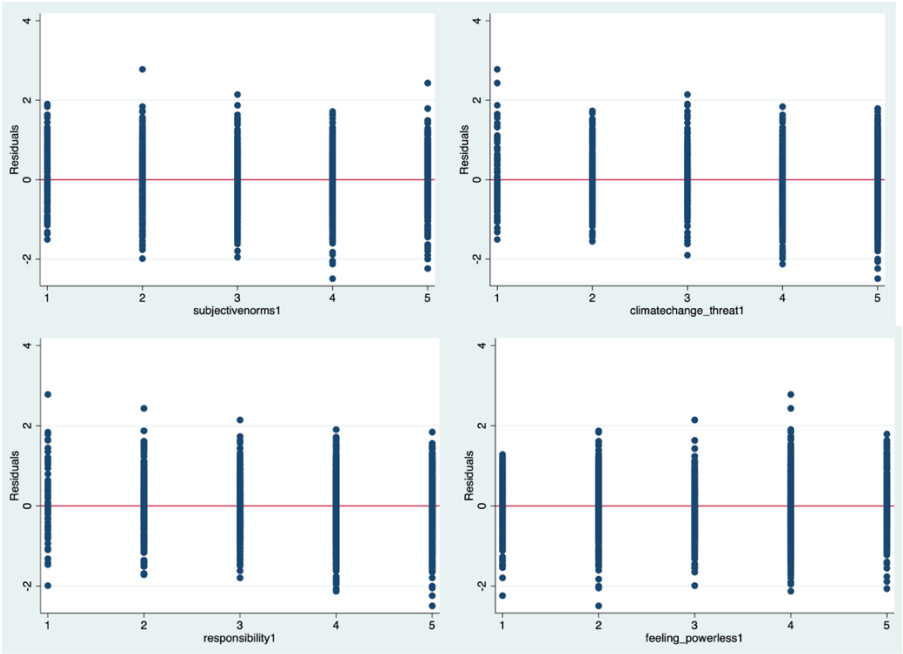
```
White's test
H0: Homoskedasticity
Ha: Unrestricted heteroskedasticity

   chi2(14) =  48.36
Prob > chi2 = 0.0000

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	48.36	14	0.0000
Skewness	47.76	4	0.0000
Kurtosis	0.10	1	0.7567
Total	96.21	19	0.0000

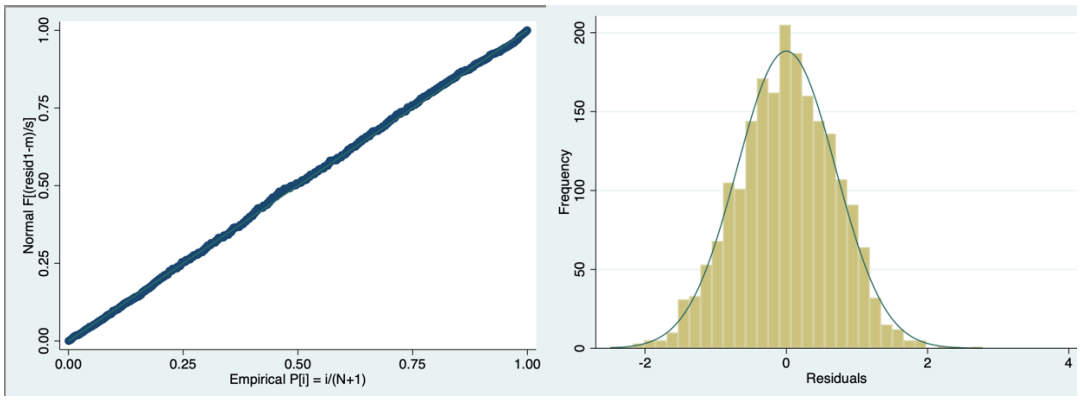
Multicollinearity

Variable	VIF	1/VIF
climatecha~1	1.56	0.640997
subjective~1	1.36	0.737594
responsibi~1	1.29	0.775320
feeling_po~1	1.11	0.903841
Mean VIF	1.33	

Independence of the residuals from the independent variable



Normal distribution and independence of residuals



Shapiro–Francia W' test for normal data

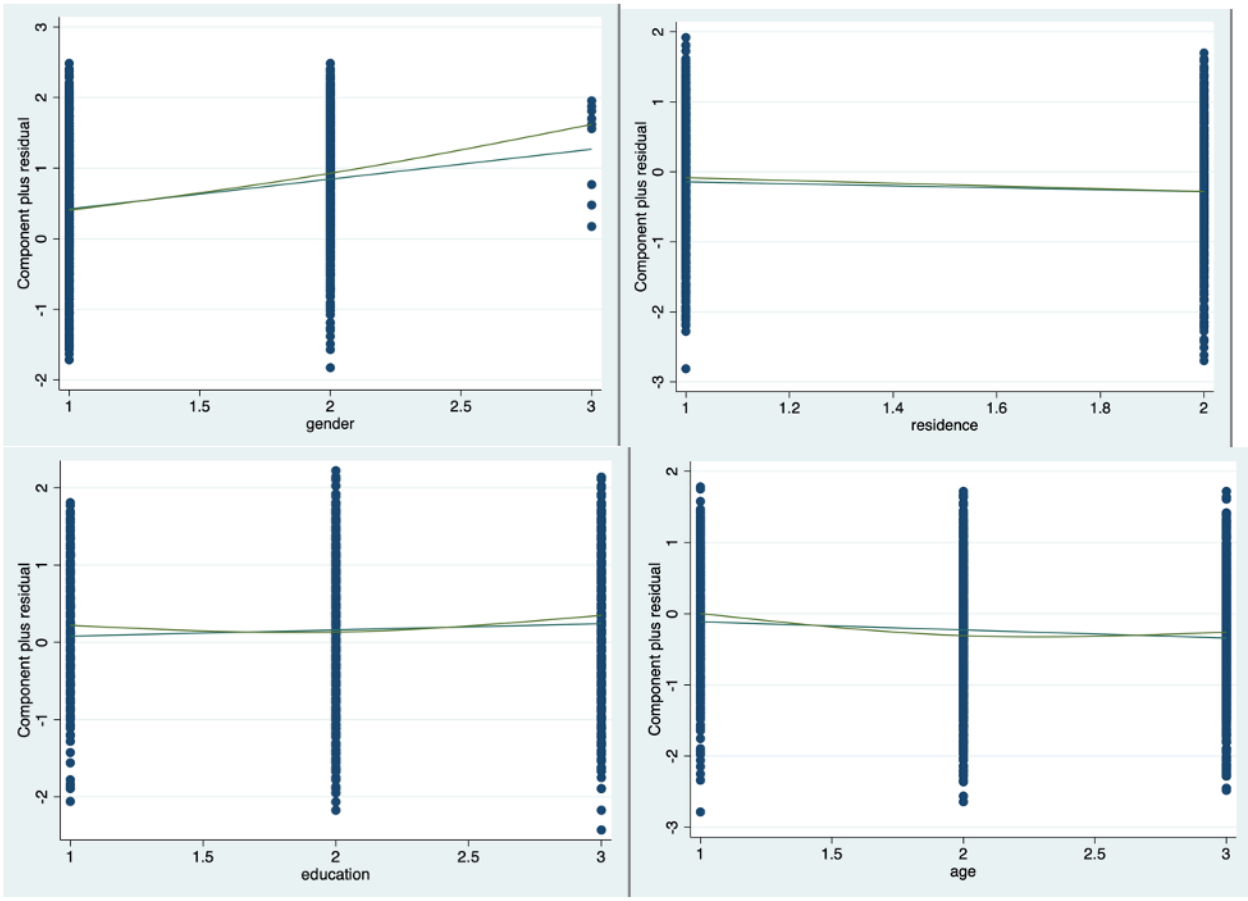
Variable	Obs	W'	V'	z	Prob>z
resid1	**2,059**	**0.99864**	**1.757**	**1.351**	**0.08831**

Appendix 5. OLS-estimation results from the first model

	Regression Coefficient	Standard error	T-value	P-value	Beta
Independent variables					
Climatechange threat	.287	.018	16.12	.000*	.401
Subjective norms	.063	.017	3.71	.000*	.086
Feeling powerless	-.127	.013	-9.65	.000*	-.188
Responsibility	.047	.018	2.61	.009*	.059
Model					
F	211.24				
Prob>F	.000				
R-squared (Selitysaste)	.308				
Adj R-squared	.307				

Appendix 6. Background assumptions of the second model

Linear connection



Specification

```
Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of mitigation

H0: Model has no omitted variables

F(3, 2048) =    1.10
  Prob > F = 0.3496
```

Homoscedasticity

White's test
H0: Homoskedasticity
Ha: Unrestricted heteroskedasticity

chi2(24) = **33.14**
Prob > chi2 = **0.1011**

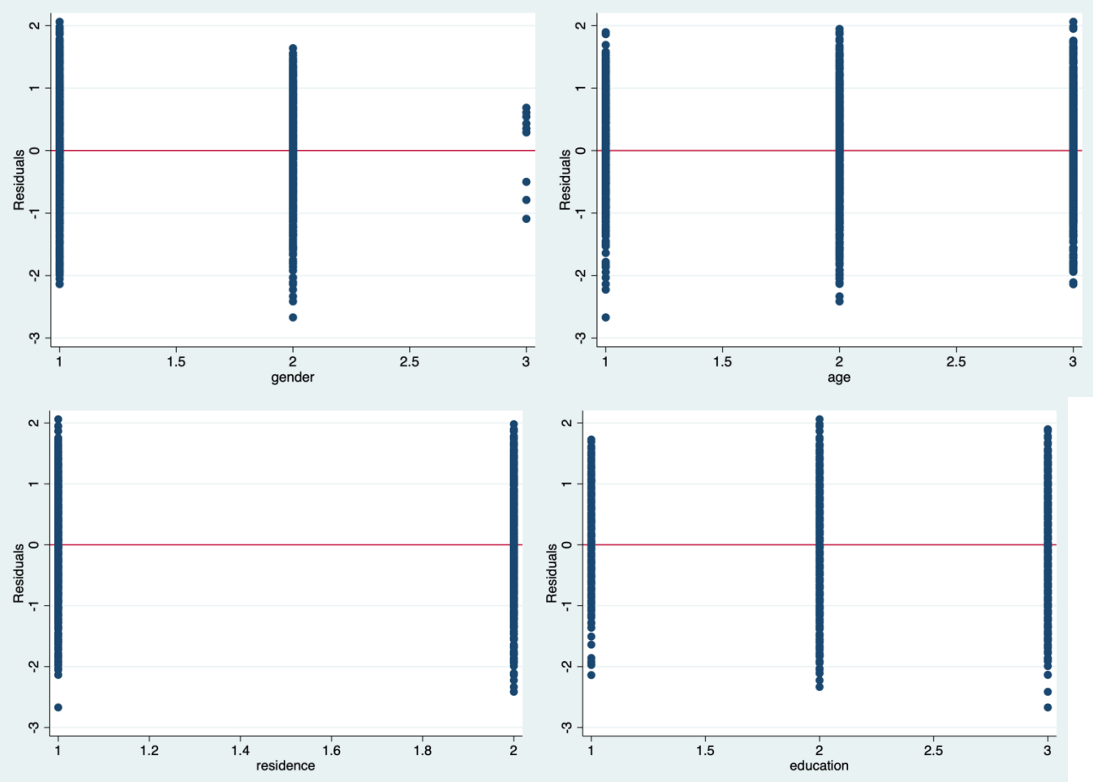
Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	**33.14**	**24**	**0.1011**
Skewness	**30.40**	**7**	**0.0001**
Kurtosis	**9.60**	**1**	**0.0019**
Total	**73.14**	**32**	**0.0000**

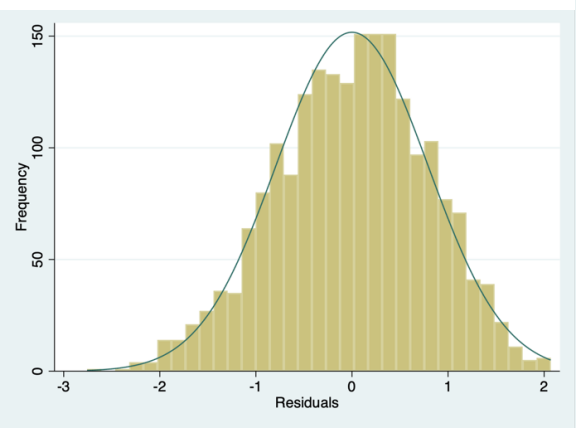
Multicollinearity

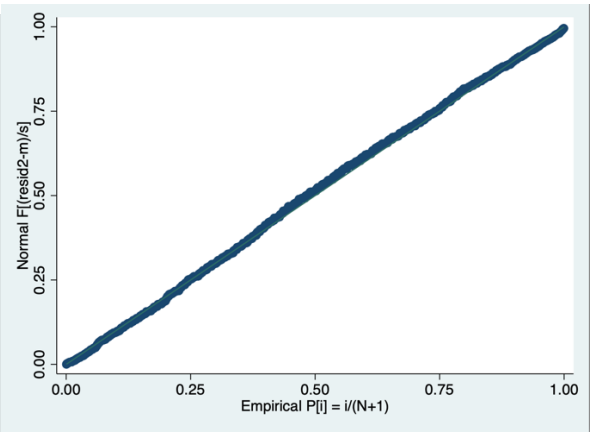
Variable	VIF	1/VIF
age		
2	**1.88**	**0.531910**
3	**1.89**	**0.528713**
gender		
2	**1.04**	**0.963813**
3	**1.02**	**0.982981**
2.residence	**1.02**	**0.981523**
education		
2	**2.30**	**0.434535**
3	**2.27**	**0.440557**
Mean VIF	**1.63**	

Independence of the residuals from the independent variable



Normal distribution and independence of residuals





Shapiro–Francia W' test for normal data

Variable	Obs	W'	V'	z	Prob>z
resid2	**2,059**	**0.99651**	**4.499**	**3.607**	**0.00015**

Appendix 7. OLS-estimation results of the second model.

	Regression coefficient	Standard error	T-value	P-value	Beta
Independent variables					
Age					
36-55	-.268	.049	-5.43	.000*	-.155
56 and over	-.248	.049	-5.07	.000*	-.146
Gender					
Women	.402	.036	11.29	.000*	.240
Other	.848	.267	3.17	.002*	.067
Residence					
Rest of Finland	-.139	.035	-3.94	.000*	-.083
Education					
Vocational school	-.027	.053	-0.51	.612	-.016
University degree	.127	.055	2.31	.021	.073
Model					
F	35.21				
Prob>F (Mallin merkitsevyys)	.000				
R-squared (Selitysaste)	.107				
Adj R-squared	.104				