

**The Effect of Income on Sustainable Food Choices**

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## Abstract

**Background:** Income influences the consumption of sustainable food, but this may differ per type of sustainable food. The current study distinguishes two types of sustainable food consumption: sustainable food choices that save money and sustainable food choices that are expensive. The theory of planned behavior is used to explain how income groups differ in their purchasing of sustainable food that is expensive, by taking importance of food price into account as a potential mediating factor. The scarcity theory is used to explain how income groups differ in their purchasing of sustainable food that saves money, by taking financial scarcity into account as potential mediating factor.

**Methods:** Data from a correlational survey was used. A nationwide sample of 1055 respondents living across the Netherlands completed the survey. Respondents reported demographic factors, their income, whether they experienced financial scarcity, if they found the price of food important and their sustainable food purchasing. PROCESS v3.0 by Hayes was used to do a mediation analysis.

**Results:** There was no significant relation between income and purchasing sustainable food that saves money. Neither, did income have a significant relation with purchasing sustainable food that is expensive. Financial scarcity was not found to have a mediating role between income and making sustainable food choices that save money. Importance of food price did have a significant role as a mediator between income and purchasing sustainable food that is expensive.

**Conclusions:** Income does not have an effect on sustainable food consumption. However, the importance individuals place on the price of food does have a mediating effect on the relation between income and expensive sustainable food. Future research could examine other explanatory factors for sustainable food consumption and might focus on a different way of measuring sustainable food consumption.

## Background

The production and consumption of food has a large impact on the environment (McMichael, 2005). Global food production is responsible for a large share of the carbon, water and ecological footprint (Verain et al., 2012). Sustainable food is less harmful to the environment. The consumption of sustainable food products becomes more important each year and can be one of the solutions in reducing these footprints (Smith & Gregory, 2012).

There is quite some debate about what can be identified as sustainable food (Garnett, 2014). Sustainable food is often seen as food with a quality mark, which can be beneficial for animal welfare, the environment or help farmers in developing countries (Wageningen Economic Research, 2019). Dutch and international examples of these quality marks are the EU organic logo, EKO, Fair Trade and Beter Leven. Organic food represents a share of the total volume of sustainable food, it is the only quality mark that is subject to European law (Wageningen Economic Research, 2019). All these examples are shown to be more expensive as conventionally produced food (Kearney, 2010; Voedingscentrum, 2017; Reisch et al., 2013). Therefore, in this study these types of sustainable food

choices are defined as *sustainable food choices that are expensive*. Besides, food consumption is growing and the worldwide livestock production is high, which has a large impact on climate change and affects individual's health in a negative way (McMichael et al., 2007). If individuals would reduce their meat and dairy intake this would have a large impact on the environment as well. This means reducing consumption and especially meat and dairy consumption is also considered to be sustainable behavior (de Boer et al., 2007). Meat, dairy and consuming more food than needed are costly as well (Voedingscentrum, 2017). Therefore, in this study reducing these types of food choices are defined as *sustainable food choices that save money*.

In the Netherlands sales in sustainable food choices that are expensive have increased over the past years. For example, in 2019 the share of these types of sustainable food within the total expenditure on food increased from 2,7% to 14% in comparison to 2009 (Wageningen University & Research, 2020). Within sustainable food choices that are expensive, organic food represents 20% of the expenditure. In 2019 around 1,7 billion euros was spent on organic food in the Netherlands, whilst in 2015 this was around 1,3 billion euros (Wageningen Economic Research, 2019; Wageningen Economic Research, 2015). Between sales in sustainable food choices that save money there are differences. Dairy consumption in the Netherlands has decreased over the past years, whilst consumption of meat has slightly increased (NZO, 2019; WUR, 2020).

In older studies being sustainable was more seen as a way of living (Schifferstein & Oude Ophuis, 1998), but nowadays more individuals are involved with sustainable food. It is found that there is a large difference in the sustainable food consumption pattern of individuals (Dagevos, 2014). For example, there is a lot of evidence for female to have a more sustainable consumption pattern than male (Mohr & Schlich, 2015; De Devitiis et al., 2012; Bulut et al., 2017; Von Meyer-Höfer et al., 2015). Besides, in most studies a positive correlation is also found between educational level and sustainable food choices (de Boer et al., 2007; Dimitri & Dettmann, 2012; Park et al., 2011). On the matter of income, the relation with sustainable food is somewhat unclear (Park et al., 2011; Roberts, 1996). It seems that low-income groups purchase less expensive sustainable food (de Boer et al., 2007; Dimitri & Dettmann, 2012). On the contrary, it seems that low-income groups do have a higher consumption of meat and meat products in comparison to high-income groups (Hulshof et al., 2003).

The literature shows consensus on some demographic factors like gender and educational level and their relation with sustainable food choices. But, on the topic of income there seems to be some contradictions. Literature shows that price is an important aspect in the consumption of expensive sustainable food (Gottschalk & Leistner, 2013; Schifferstein & Oude Ophuis, 1998). This could mean that low-income groups lack the resources to buy expensive sustainable food. This seems contradictory, since reducing meat consumption would be a sustainable choice that saves money. An explanation for this could be that due to experienced financial scarcity these people lack the cognitive bandwidth to buy less meat (Mani et al., 2013). To find out important factors that explain the link between income and sustainable food choices in the Netherlands, it is important to examine this more

into detail. With this additional knowledge, it is easier to create policy and develop strategies in which the food consumption pattern of specific groups can be targeted by governmental organizations, the industry and retailers. This can be beneficial to health and the environment (McMichael et al., 2007). Therefore, the goal of the following study is to examine the effect of income on making sustainable food choices. Due to the differences in price levels of sustainable food choices, they are divided into two groups. The first group, *sustainable food choices that are expensive*, includes: organic food, free-range meat and products with a sustainability label (EKO, Fair Trade, Beter Leven). For this group the importance of food price is examined as a potential mediating factor. The second group, *sustainable food choices that save money*, includes a reduction in food consumption and a reduction in meat and dairy products. For this group financial scarcity is examined as a potential mediating factor.

### **Existing Literature**

A lot of research has been conducted on the relation between income and sustainable choices. Sustainable behaviors like investing in solar panels or reducing water usage do not seem to differ between different income groups (Wolske, 2020; Corral-Verdugo et al., 2006). For example, consumers who are more future-oriented show more water saving behavior whilst people who live more in the present show more anti-environmental behavior (Corral-Verdugo et al., 2006). When it comes to investing in solar panels, consumers of high- and low-income groups have similar reasons to do so (Wolske, 2020). For instance, both groups had an interest in new technologies and felt obligated to address energy issues (Wolske, 2020). Findings about the relation between income and recycling behavior differ. Some research shows that low-income households are more likely to recycle for money than high-income households (Ashenmiller, 2006). Besides that, evidence shows that high-income households engage more in recycling (Seacat & Boileau, 2018). Lastly, green purchasing behavior is not determined by income or other demographic factors, subjective norms of consumers seem to play an important role in this behavior (Liobikienė et al., 2016; Wang, 2014). Buying sustainable food is part of green purchasing behavior, but this specific behavior is more widely examined with divergent results.

The relation between income and sustainable food choices that are expensive is extensively researched. De Boer et al. (2007) show that Dutch people with a higher income purchase more free-range meat than people with a low income. In studies about the relation between organic food and organic food purchasing results show as income increases the likelihood of someone purchasing organic food increases as well (Dimitri & Dettmann, 2012; Wee et al., 2014; Abeliotis et al., 2010). Kriwy and Mecking (2011) did not find a relation between household income and being a regular organic food purchaser, but as income increased the amount of money spent on organic food increased as well. Important factors that play a role for customers in the purchase of expensive sustainable food are the price, quality, a better taste and availability (Gottschalk & Leistner, 2013; Schifferstein & Oude Ophuis, 1998). Other reasons for people to buy sustainable food that are expensive are safety,

environmental factors, health, and animal welfare (Wee et al., 2014; Harper & Makatouni, 2002). Health seems to be the most important motive to buy organic food (Gottschalk & Leistner; Ureña et al., 2008). But for purchasing organic food, the high price has shown to be the main obstacle (Hughner et al., 2007).

The relation between income and sustainable food choices that save money is also researched elaborately, but the focus of this research lies mostly on the link between income and meat consumption. Hulshof et al. (2003) measured the dietary intake over 10 years in the Netherlands, with the goal to measure if food consumption changed during 1987-1988 to 1997-1998. They found that groups with a low socioeconomic status consumed more meat than people with a high socioeconomic status. Besides, an American study shows that low-income households had a higher consumption of beef, pork and processed pork (Guenther et al., 2005). This same link was found in a study in the UK where results showed that lower socioeconomic groups consume more red and processed meat and have a higher frequency in their consumption of meat than groups with a higher socioeconomic status (Clonan et al., 2016).

Most research seem to have similar outcomes on the effect of income on making sustainable food choices that are expensive and sustainable food choices that save money (Dimitri & Dettmann, 2012; Wee et al., 2014; Abeliotis et al., 2010; de Boer et al., 2007; Hulshof et al., 2003; Guenther et al., 2005; Clonan et al., 2016). Because of the radical increase in the sales of expensive sustainable food choices in recent years it is useful to invest this connection once more (Wageningen University & Research, 2020). Next to that, most studies focus on one form of sustainable behavior. Expensive sustainable behavior studies are mostly about organic food and research about sustainable food choices that save money is almost all about meat consumption (Dimitri & Dettmann, 2012; Wee et al., 2014; Abeliotis et al., 2010; de Boer et al., 2007; Hulshof et al., 2003; Guenther et al., 2005; Clonan et al., 2016). Therefore, it is important to invest in other sustainable behaviors as well. Moreover, to my knowledge there are no studies that make a distinction between two types of sustainable behaviors. Because of the difference in the literature about the effect of income on these two types of sustainable behavior it is interesting to examine these types separately. Furthermore, most research has looked into the effect of demographic factors on sustainable food choices but has lacked to search for explanatory factors that might explain this effect (Dimitri & Dettmann, 2012; Wee et al., 2014; Abeliotis et al., 2010; de Boer et al., 2007; Hulshof et al., 2003; Guenther et al., 2005; Clonan et al., 2016).

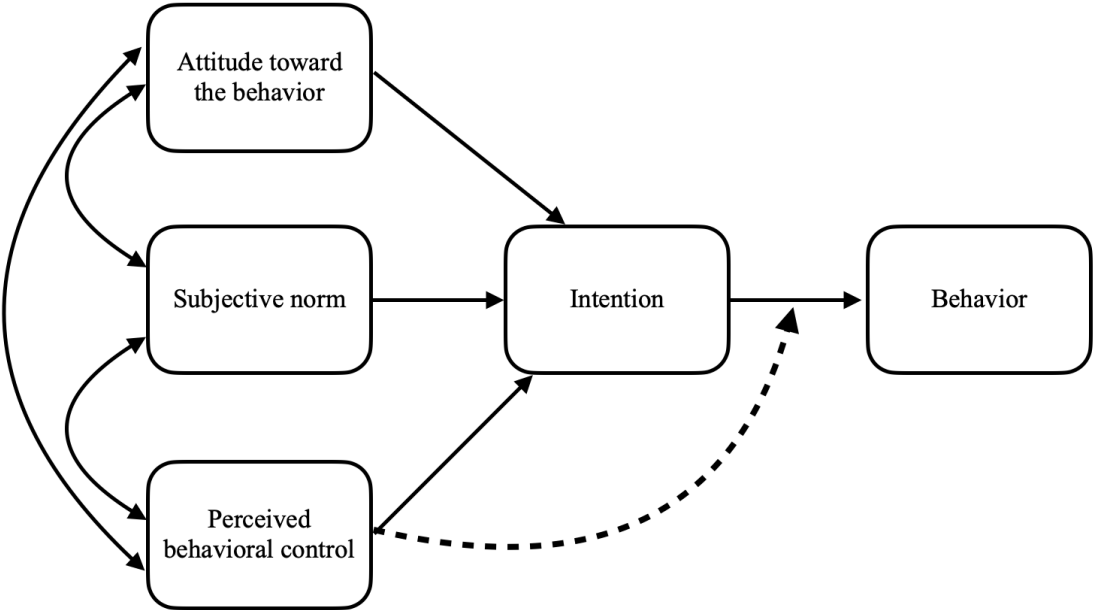
## **Theoretical Framework**

### **Theory of Planned Behavior**

To find an explanation for the effect of income on the two types of sustainable food choices the Theory of Planned Behavior (TPB) and the Scarcity Theory are introduced. The TPB states that the behavior of an individual is influenced by normative beliefs, behavioral beliefs and control beliefs (McKenzie et al., 2017). Normative beliefs are beliefs about the expectations of others and result in

perceived social pressure or a subjective norm (Ajzen, 2006). Behavioral beliefs are beliefs about the likely outcomes of behavior and can produce a favorable or unfavorable attitude toward the behavior (Ajzen, 2006). Control beliefs are beliefs about the existence of factors that may facilitate or hinder performance of the behavior, they can lead to perceived behavioral control or self-efficacy (Ajzen, 2006). The perceived behavioral control has a moderating effect on the subjective norm and the attitude toward the behavior. The stronger the attitude toward the behavior, subjective norm and perceived behavioral control are, the greater the chance that an individual will have the intention to perform a behavior (Ajzen, 2006). Figure 1 shows a visual representation of the TPB.

**Figure 1**  
*Theory of Planned Behavior*



The TPB is often used to explain sustainable behavior. Subjective norms and attitudes toward the behavior have been linked to have a significant influence on sustainable food choice and the purchase of environmentally friendly products (Aertsens et al., 2009; Liobikienė et al., 2016). Income and price respectively can be seen as perceived abilities or perceived barriers and can be a factor that may facilitate or hinder the making of sustainable food choices (Aertsens et al., 2009). These perceived abilities and barriers are part of the perceived behavioral control someone has. Perceived behavioral control indicates whether the consumer can easily consume a certain product or whether its consumption is difficult or impossible (Liobikienė et al., 2016). According to McKenzie et al. (2017) perceived behavioral control is one of the most important factors in the theory of planned behavior. Without perceived behavioral control, the intentions to perform a behavior are minimal, even if the attitude toward the behavior and the subjective norm are strong. Besides that, there is a direct connection between perceived behavioral control and behavior (McKenzie et al., 2017). As literature

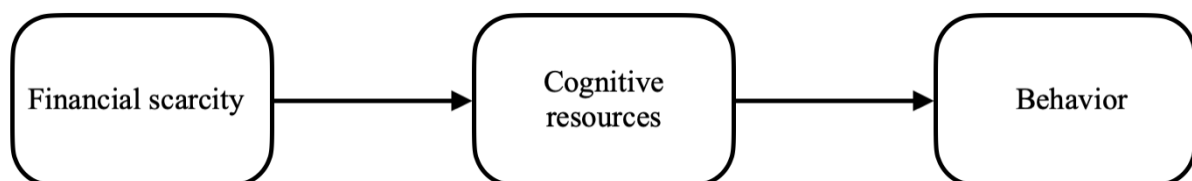
shows price is the most important obstacle in buying sustainable food that is expensive (Dimitri & Dettmann, 2012; Wee et al., 2014; Abeliotis et al., 2010; de Boer et al., 2007; Hughner et al., 2007). The price of this type of food can be seen as the perceived barrier or perceived ability to purchase this kind of food. As low-income groups purchase less sustainable food that is expensive, in this study the importance of the price of food can thus be seen as a control belief which may influence the intention to buy expensive sustainable food.

### **Scarcity Theory**

Although the TPB could explain the price of food and the resources or income someone has, influences their sustainable food purchasing behavior. It seems somewhat contradictory that groups with a low socio-economic status consume more or equally as much meat and meat products as groups with a high socio-economic status (Hulshof et al., 2003; Guenther et al., 2005). Because meat and dairy products are relatively expensive in comparison to plant-based food (Voedingscentrum, 2017). This contradictory information could be explained by the scarcity theory (Shah et al., 2012). This theory states that individuals who are poor do not just have to handle a lack of money but also experience a lack of cognitive resources (Mani et al., 2013; Shah et al., 2012; Zhao & Tomm, 2018). It was found that the cognitive impact of poverty is quite significant and could be compared to losing a full night of sleep or a decrease in 13 IQ points (Mani et al., 2013). Besides that, financial scarcity is shown to have a negative impact on health (Bakkeli, 2020). Low-income groups might experience financial scarcity. The scarcity in resources changes how people look at problems and make decisions. Scarcity creates cognitive load which has a negative influence on performance (Shah et al., 2012, Zhao & Tomm, 2018). Because meat consumption is accustomed in the diet of low-income groups, it might be difficult to change this behavior for this group. Due to the financial scarcity they experience, this group does not have the cognitive bandwidth to for example change their diet or learn how to cook without meat. This might explain why low-income groups engage less in making sustainable food choices that save money. Figure 2 shows a visual representation of the scarcity theory.

**Figure 2**

*Scarcity Theory*



## Research Questions

Previous research has mostly focused on one form of sustainable food consuming behavior in relation to income (Dimitri & Dettmann, 2012; Wee et al., 2014; Abeliotis et al., 2010; de Boer et al., 2007; Hulshof et al., 2003; Guenther et al., 2005; Clonan et al., 2016). Dividing sustainable food into two categories, namely sustainable food choices that are expensive and sustainable food choices that save money is a new approach. Besides, researching factors that might explain sustainable food consuming behavior among different income groups will help to add to the literature. Therefore, the goal of the following study is to examine the effect of income on making sustainable food choices. Additionally, financial scarcity and importance of food price will be examined as potential mediators. The following questions will be addressed:

Q1: *What is the effect of income on making sustainable food choices that are expensive?*

Q2: *To what extend can the effect of income on making sustainable food choices that are expensive be explained by importance of food price?*

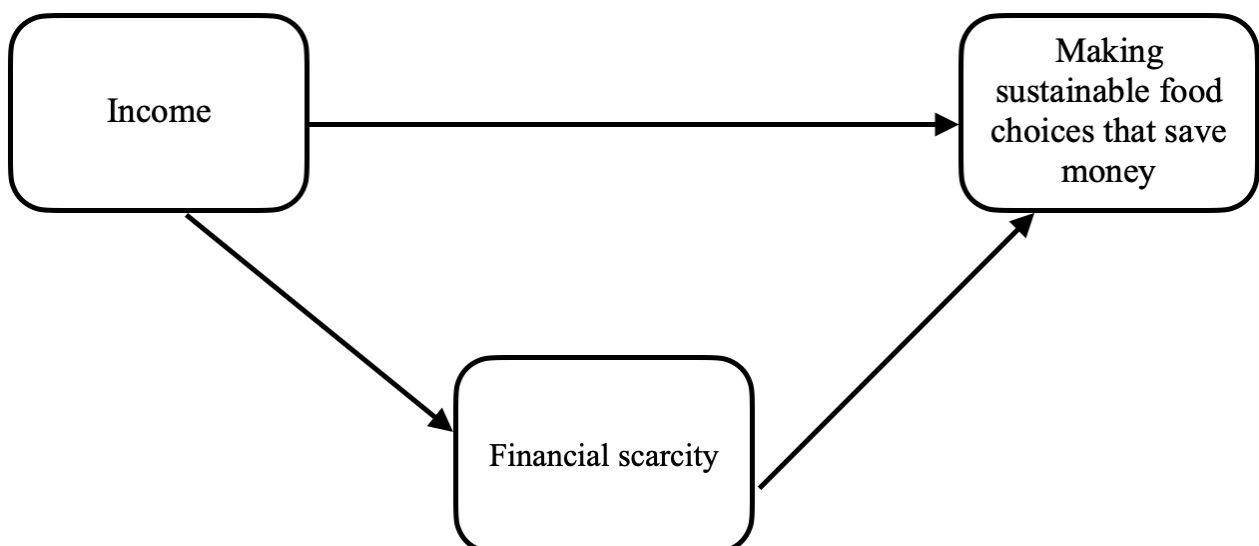
Q3: *What is the effect of income on making sustainable food choices that save money?*

Q4: *To what extend can the effect of income on making sustainable food choices that save money be explained by financial scarcity?*

To answer the first and second question the TPB will be used. To answer the third and fourth question the scarcity theory will be used. Figure 3 and 4 show representations of the conceptual models in which all important factors for this study are visualized.

**Figure 3**

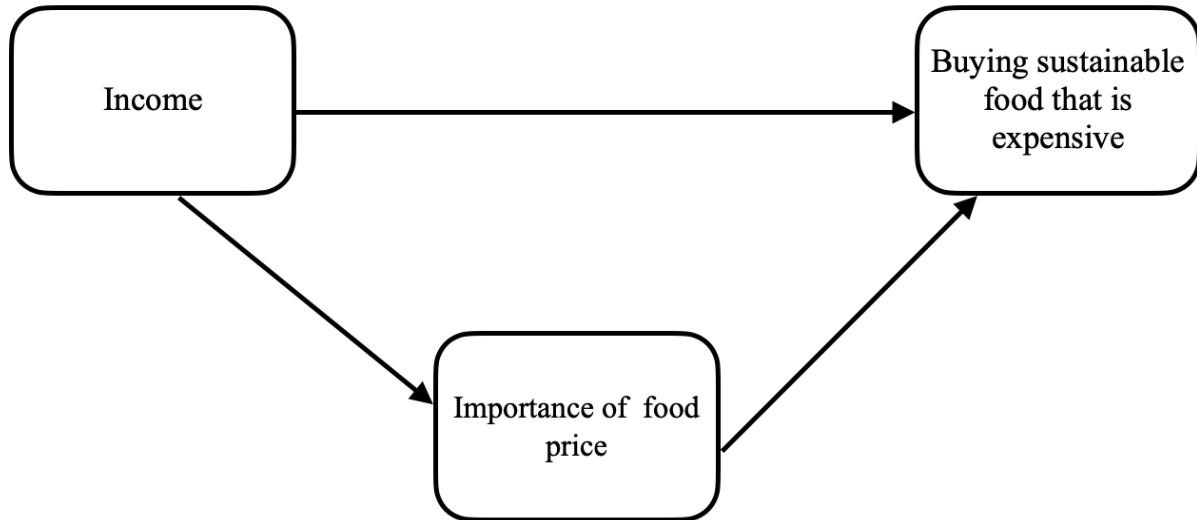
*Conceptual Model of the Factors Influencing Sustainable Food Choices that Save Money*





**Figure 4**

*Conceptual Model of the Factors Influencing Buying Sustainable Food Choices that is Expensive*



### **Hypotheses**

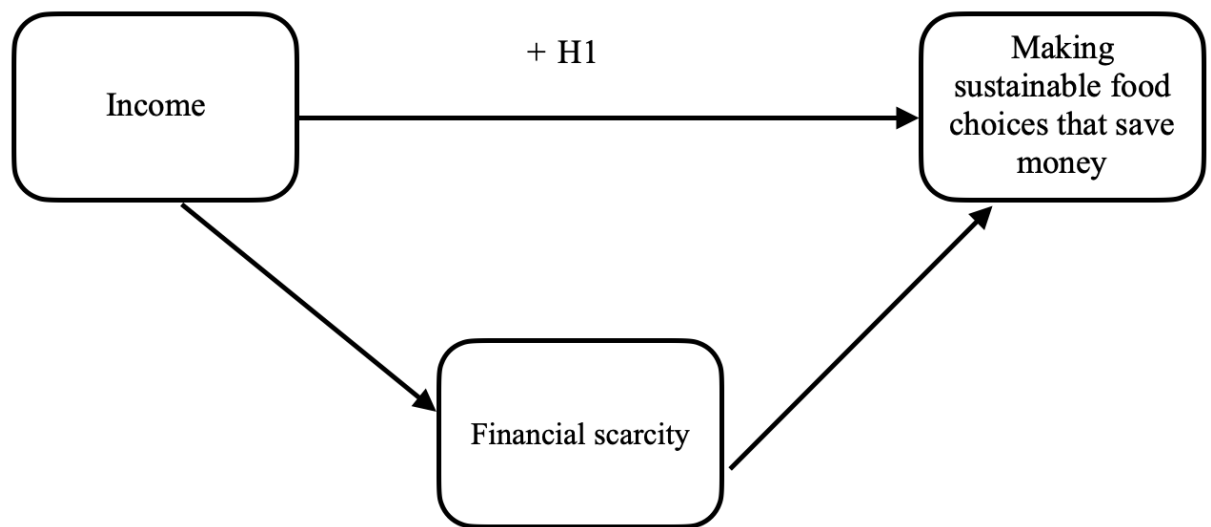
Past research has mostly focused on the relation between income and meat consumption. It was found that individuals with a low socioeconomic status consumed more meat than people with a high socioeconomic status (Hulshof et al., 2003). Besides, it was found that low-income groups have a higher meat intake than high-income groups (Guenther et al., 2005; Clonan et al, 2016). This means it is expected that high-income groups consume less meat than low-income groups. Based on this information *hypothesis 1* is formed:

H1: Income has a positive effect on making sustainable food choices that save money.

Figure 5 shows a visual representation of hypothesis 1.

**Figure 5**

*Conceptual Model with Hypothesis 1*



The scarcity theory states that low-income groups might experience financial scarcity. This scarcity in resources changes how people look at problems and make decisions (Shah et al., 2012). Besides that, scarcity creates cognitive load which has a negative influence on performance (Shah et al., 2012). This lack in cognitive resources could mean it is difficult for low-income groups to change their meat consuming behavior because this is accustomed in their diet. Based on this information *hypothesis 2* is formed:

H2: Financial scarcity will mediate the positive effect income has on sustainable food choices that save money.

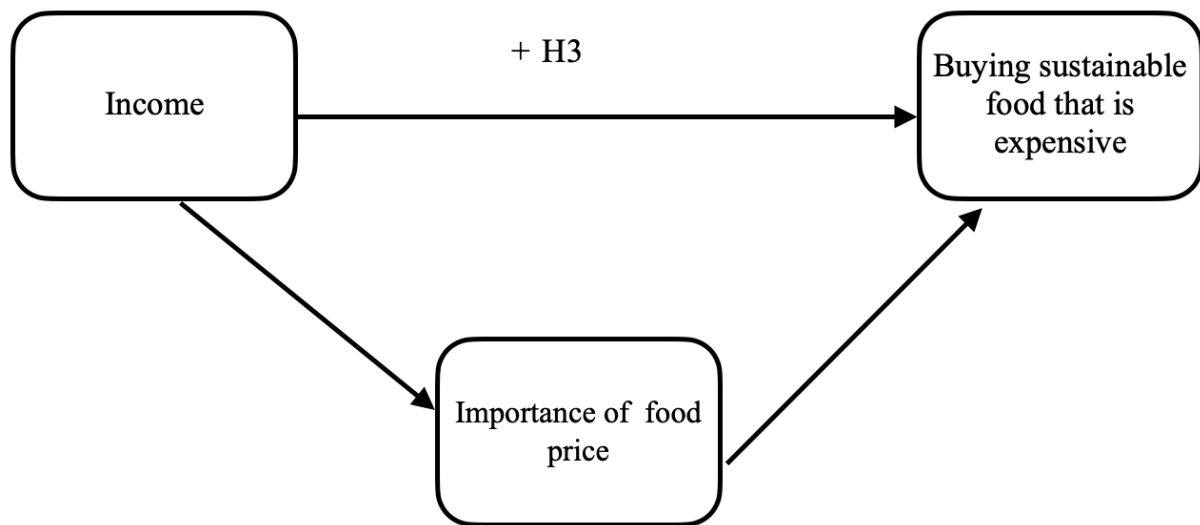
According to the TPB a lack of abilities or control beliefs can have an impact on behavior. Financial resources or income can be seen as abilities. Therefore, a lack of income may negatively influence the purchasing of expensive sustainable food (Aertsens et al., 2009). Next to that, earlier research has shown that income has a positive influence on the likelihood of someone purchasing organic food (de Boer et al., 2007; Dimitri & Dettmann, 2012; Wee et al., 2014; Abeliotis et al., 2010). Based on this arguments *hypothesis 3* is formed:

H3: Income has a positive effect on making sustainable food choices that are expensive.

Figure 6 shows a visual representation of hypotheses 3.

**Figure 6**

*Conceptual Model with Hypothesis 3*



Literature shows that low-income groups purchase less sustainable food that is expensive and that price is the most important obstacle in buying this type of food (Dimitri & Dettmann, 2012; Wee et al., 2014; Abeliotis et al., 2010; de Boer et al., 2007; Hughner et al., 2007). Based on this information *hypotheses 4* is formed:

H4: Importance of food price will mediate the positive effect income has on sustainable food choices that are expensive.

## **Methods**

### **Recruitment, Data, Design and Participant Sample**

This study made use of quantitative online survey data used for secondary analysis. The acquired data set was originally used by the study of van Rongen et al. (2020). Data was used which was obtained by Flycatcher, a panel bureau. Flycatcher recruited a sample living across the Netherlands by emailing 1988 respondents to take part in the survey. The respondents had 7 days to finish the survey and people who did not respond received a reminder email one day before the survey closed. The data were gathered in January and February 2019. The study wanted to find corresponding relationships between various variables and therefore had a correlational survey design. Because of the length of the survey, it was distributed into two waves. The first one measured demographics and financial scarcity. The second one, taken four weeks later, assessed sustainable food consumption. The first survey was completed by 1336 respondents. The second survey was filled in by 1055 respondents. To start the analysis 281 respondents with missing data for food consumption were deselected and then deleted from the file. After they were deleted 1055 participants (mean age= 45.4,

SD= 10.3, 58% female, 95% Dutch ethnicity) remained in total. The sample was representative for the Dutch population with respect to age, gender, educational level and province, and included respondents in the age 25-60 years not currently enrolled in education.

### **Ethical Considerations**

Because online survey data for secondary analysis were used some ethical aspect had to be examined. All participants provided written informed consent for the study. Besides, all data were collected via an anonymous panel. In the survey participants had to fill in some personal information and their postcode. With all this information it might have been possible to discover some participants. For the current study the postcode information was not of any interest. Therefore, de-identification was used and only the necessary information about the participants was visible for the research. Data was stored in a safe environment and could only be accessed by entering a password.

### **Dependent Variables**

The dependent variable *sustainable food choices that are expensive* was measured by the following questions: In the survey participants had to fill in whether they had performed the following acts at least once a month in the past year, by answering yes or no: (1) Buy organic meat, (2) Buy organic vegetables and fruit, (3) Buy organic dairy products (milk, yoghurt or cottage cheese), (4) Buy free-range meat and (5) Buy products with a sustainability label (EKO, Fair Trade, Beter Leven). This variable was measured on an interval level. The answer 'no' was measured with the value of 0 and the answer 'yes' was measured with the value 1. After that, a new variable was computed by taking the mean of the 5 items.

The dependent variable *sustainable food choices that save money* was measured by the following questions: In the survey participants had to fill in whether they had performed the following acts at least once a month in the past year, by answering yes or no: (1) Consume smaller portions of meat, (2) Eat less, (3) Eat fewer dairy products (milk, yoghurt, cottage cheese) and (4) Do not eat meat once a week. This variable was measured on an interval level. The answer 'no' was measured with the value of 0 and the answer 'yes' was measured with the value 1. After that, a new variable was computed by taking the mean of the 4 items.

### **Independent Variable**

The independent variable *income group* was added to the datafile by Flycatcher, the panel bureau. There were three income groups. Households with a gross annual income below €13.300 were put in the low-income group. Households with a gross annual income between €13.301 and €41.200 were put in the medium-income group. Households with a gross annual income above €41.200 were put in the high-income group. This variable was measured on an ordinal level.

## **Potential Mediators**

To measure the potential mediator *financial scarcity*, four questions were used from the survey. The questions informed how individuals experienced their daily financial situation in the previous 4 weeks. They could answer all four questions on a 5-point scale ranging from never (1) to all the time (5). The following questions were used: (1) How often did you have to consider where to spend your money on? (2) How often were you worried about money? (3) How often did you have to think carefully about your expenses? (4) How often did you have the feeling that you were short of money? This variable was measured on an interval level. A new variable was computed by taking the mean of the 4 items.

To measure the potential mediator *importance of food price* the following question from the survey was used: below are statements about characteristics of nutrition, please fill in the importance of each characteristic. They could answer the question on a 4-point scale ranging from not important (1) to very important (5). The following statement was used: ‘To me it is important that the food that I consume on an average day is not expensive.’ This variable was measured on an interval level.

## **Confounding Variables**

The confounding variable *gender* was measured by asking whether individuals were male, female or different. This variable was measured on a nominal level.

To measure the confounding variable *age* respondents were asked to fill in their age in years. This variable was measured on a ratio level.

To measure the confounding variable *educational level* the following question from the survey was used: “Fill in what the highest education level is you completed with a diploma.” To answer this question multiple options were given, these included: ‘no education’, ‘primary education’, ‘lower vocational education (e.g., VMBO, LTS, LHNO, huishoudschool, LEAO)’, ‘secondary general education (e.g., LAVO, MULO/MAVO, 3-year HBS)’, ‘secondary vocational education, MBO (e.g., MTS, MEAO)’, ‘secondary general education (e.g., HAVO, VWO, HBS, MMS)’, ‘higher professional education, HBO (e.g., HTS, HEAO, MO)’, ‘university education, WO’, ‘different, namely ...’. This variable was measured on an ordinal level. In the datafile this data was divided into 3 groups. No education, primary education, lower vocational education and secondary general education were combined in the low level of education group. Secondary vocational education and secondary general education were grouped in the medium level of education group. Higher professional education and university education were combined in the high level of education group.

## **Statistical Analysis**

A statistical analysis was performed on the data using IBM SPSS Statistics 26. The data was explored by making crosstabs. Additionally, mediation analysis was used to test all hypotheses. PROCESS v3.0 by Hayes measured the effect of income on sustainable food choices that save money, using financial scarcity as a mediating variable. PROCESS v3.0 by Hayes also measured the effect of income on sustainable food choices that are expensive, using importance of food price as a mediating variable. For both analysis age, educational level and gender were added as confounding variables. Ninety-five percentage confidence intervals were made by bootstrapping (5000 resamples) to test for indirect effects through mediation in both analyses.

## **Results**

### **Descriptive statistics**

As table 1 shows the mean age for the different income groups is quite similar. For gender there seem to be larger differences, with the low-income group having 26% male and the high-income group having 60% male. Next to that, for educational level there seem to be large differences between the income groups. With the low-income group reporting a share of 37.0% who were in the low-education group and 15.0% who were in the high-education group. For the high-income group this is respectively 10.3% and 47.0%.

The variable sustainable food choices that save money did not seem to vary large between the different income groups. With the low-, medium- and high-income group reporting a mean of respectively 0.43, 0.41 and 0.41. The variable sustainable food choices that are expensive seems to increase a bit per income group. With the low-, medium- and high-income group reporting a mean of respectively 0.38, 0.42 and 0.46. The mean outcome on financial scarcity seems to decrease with an increase in income. With the low-income group reporting a mean of 3.55 on financial scarcity and the high-income group a mean of 2.20. Furthermore, Table 1 shows that low-income groups seem to place more importance on the price of food than high-income groups. Within the low-income group 41.9% found the price very important, whilst in the high-income group this was 8.2%.

**Table 1**

*Descriptives and Income Differences for Demographics, Sustainable Food Purchasing and Potential Mediators*

	Low-income (n = 387)	Medium-income (n = 338)	High-income (n = 330)	Total sample (n = 1,055)
Age in years (mean, SD)	46.45 (10.13)	45.36 (10.43)	44.32 (10.46)	45.44 (10.36)
Gender (% male)	26	45	60	42
Level of education (%)				
Low	37.0	30.8	10.3	26.7
Medium	46.5	50.9	42.4	46.6
High	15.0	18.3	47.0	26.1
Unknown	1.5	0	0.3	0.6
Sustainable food choices that save money (mean, SD) <sup>a</sup>	0.43 (0.33)	0.41 (0.34)	0.41 (0.33)	0.42 (0.33)
Sustainable food choices that are expensive (mean, SD) <sup>a</sup>	0.38 (0.34)	0.42 (0.34)	0.46 (0.37)	0.42 (0.35)
Financial scarcity (mean, SD) <sup>b</sup>	3.55 (0.95)	2.96 (1.00)	2.20 (0.85)	2.94 (1.09)
Importance of food price (%)				
Not important	1.7	2.0	11.2	4.8
A bit important	17.6	26.6	40.3	27.6
Quite important	38.8	48.5	40.3	42.4
Very important	41.9	22.9	8.2	25.2

<sup>a</sup>Answer scale ranging from 0 to 1; <sup>b</sup>Answer scale ranging from 1 to 5.

As is shown in Table 2 income had a significant effect on financial scarcity ( $B = -.6446$ ,  $p < .001$ ). This means that as income increases, financial scarcity decreases. Financial scarcity did not have a significant effect on making sustainable food choices that save money ( $B = .0082$ ,  $p > .05$ ). Also, income did not have a significant effect on making sustainable food choices that save money ( $B = .0116$ ,  $p > .05$ ). This means hypothesis 1 is rejected, as displayed in Table 2 and Figure 7.

**Table 2**

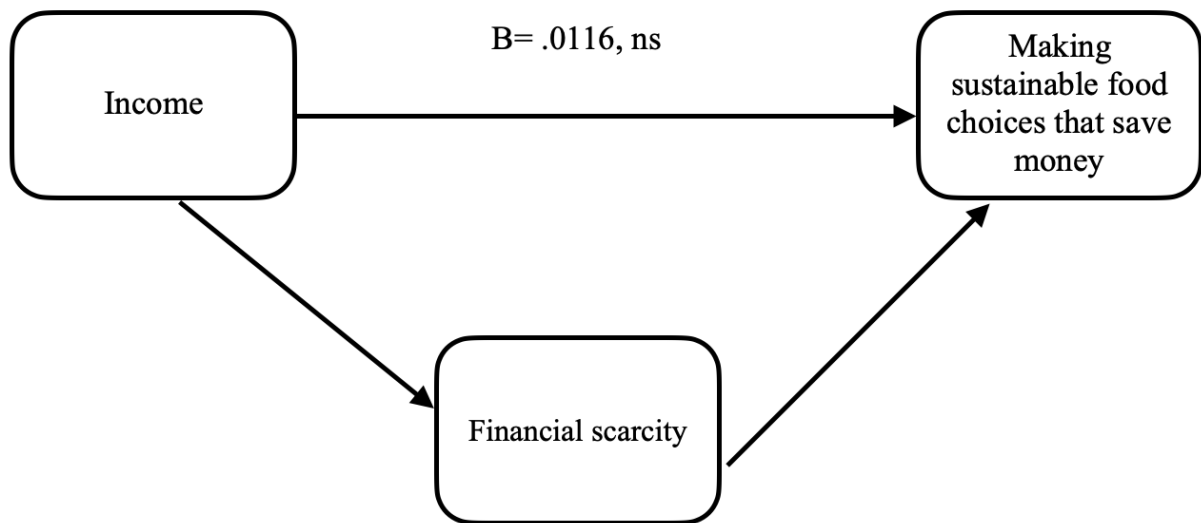
*Effects Income, Financial Scarcity and Sustainable Food Choices that Save Money*

	B
Income → Financial scarcity	-.6446***
Income → Sustainable food choices that save money	.0116
Financial scarcity → Sustainable food choices that save money	.0082

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Figure 7**

*Results of Hypothesis 1*



\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . ns = not significant.

Results of the mediation analysis reject the mediating role financial scarcity has on the relation between income and sustainable food choices that save money ( $B = -.0053$ ;  $CI = -.0194$  to  $.0091$ ), as is shown in Table 3. This means hypothesis 2 is also rejected.

**Table 3**

*Results of the Mediation Analysis with Financial Scarcity as Potential Mediator*

	B	95% CI	SE
Direct effect	.0116	[-.0175, .0407]	.0148
Indirect effect	-.0053	[-.0194, .0091]	.0072

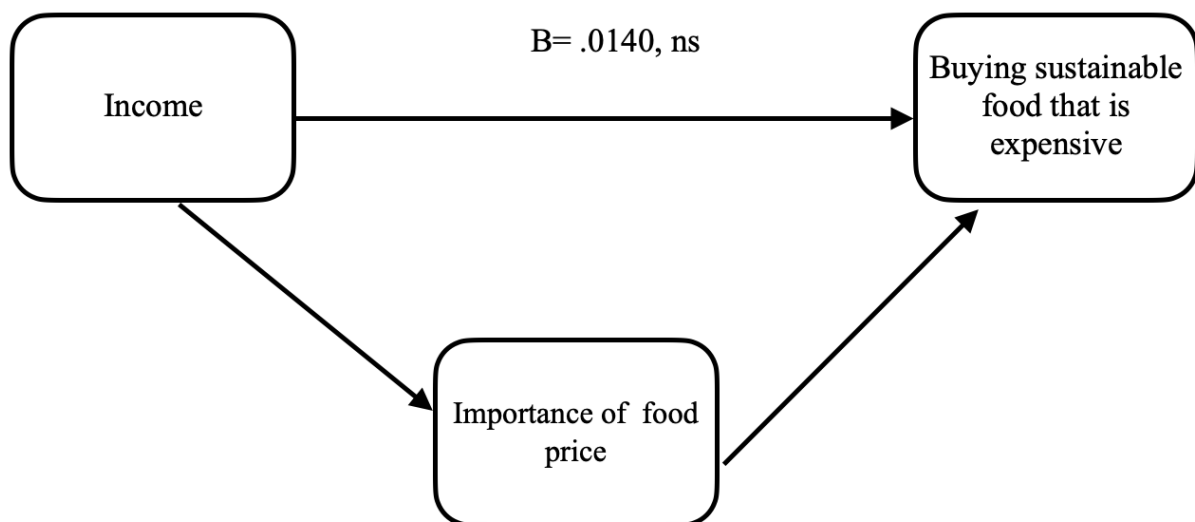
As is shown in Table 4 income had a significant effect on importance of food price ( $B = -.3282$ ,  $p < .001$ ). This means that as income increases, individuals place less importance on the price of food. Importance of food price had a significant effect on sustainable food choices that are expensive ( $B = -.0796$ ,  $p < .001$ ). This means that as the importance individuals place on the price of food increase, the chances that they will purchase sustainable food that is expensive decrease. The effect of income on buying sustainable food that is expensive was not significant ( $B = .0140$ ,  $p > .05$ ), this means that hypothesis 3 is rejected. Result of hypothesis 3 are shown in Table 4 and Figure 8.



**Table 4***Effects Income, Importance of Food Price and Sustainable Food Choices that are Expensive*

	B
Income → Importance of food price	-.3282***
Income → Sustainable food choices that are expensive	.0140
Importance of food price → Sustainable food choices that are expensive	-.0796***

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Figure 8***Results of Hypothesis 3*

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . *ns* = not significant.

Results of the mediation analysis confirm the mediating role importance of food price had on the relation between income and sustainable food choices that are expensive ( $B = .0261$ ;  $CI = .0162$  to  $.0368$ ), as is shown in Table 5. This a partial mediation. This means hypothesis 4 is confirmed.

**Table 5***Results of the Mediation Analysis with Importance of Food Price as Potential Mediator*

	B	95% CI	SE
Direct effect	.0140	[-.0140, .0419]	.0143
Indirect effect	.0261	[.0162, .0368]	.0052

## Discussion

This study explored whether income had a significant effect on making sustainable food choices that save money or that are expensive, with respectively financial scarcity and importance food price as mediating factors.

Results show that there was no significant relation between income and making sustainable food choices that save money. This is not in line with earlier research, which found that low-income have a higher consumption of sustainable food choices that save money (Hulshof et al., 2003; Guenther et al., 2005; Clonan et al., 2016). One explanation for this might be that previous research mostly focused on the relation between income and meat consumption. In this paper also eating fewer dairy products and eating less were used as examples of sustainable food choices that save money. Besides that, the questions did not focus on the amount of sustainable food choices that save money individuals consumed. Thus, it could be that there is still a difference in consumption between income groups but that this did not become visible because of the way the questions were asked.

Financial scarcity was not found to have a mediating effect on the relation between income and sustainable food choices that save money. A possible explanation might be that there are other factors of importance that have a larger influence than financial scarcity. As literature shows it could be that subjective norms play an important role (Liobikienė et al., 2016; Wang, 2014).

In contrast to the hypothesis, there was no significant relation between income and buying sustainable food that is expensive. This is not in line with earlier research showing that high income groups purchase more sustainable food that is expensive (de Boer et al., 2007; Dimitri & Dettmann, 2012; Wee et al., 2014; Abeliotis et al., 2010). One explanation for this outcome could be that sales in the Netherlands in sustainable food have increased a lot in recent years (Wageningen University & Research, 2020). This could mean that a relatively large part of the population purchases at least a small quantity of sustainable food that is expensive. As the survey does not ask about the amount of expensive sustainable food individuals consume, but only whether they performed this behavior at least once a month in the past year. It could mean that even low-income groups will purchase sustainable food that is expensive but they will do this on a lower frequency. Another explanation for this outcome could be that income is not an important factor in the purchasing of sustainable food that is expensive but that other factors play a more important role. Research has shown that knowledge and norms are important explanatory factors for the purchasing of sustainable products (Liobikienė et al., 2016; Clonan et al., 2016). It could thus mean that these factors play a more important role than income.

Importance of food price was found to mediate the relation income has on buying sustainable food that is expensive. This was in line with earlier research and expectations that also found that price is the most important obstacle in the purchasing of sustainable food that is expensive (Dimitri & Dettmann, 2012; Wee et al., 2014; Abeliotis et al., 2010; de Boer et al., 2007; Hughner et al., 2007).

There are multiple strengths when it comes to this study. It has made a contribution to literature by linking income to two different forms of sustainable food purchasing. Next to that, the sample was representative for the Dutch population with respect to age, gender, educational level and province. This means the results can be generalized to the Dutch population.

Several limitations should be taken into account when interpreting the results of this study. The survey made use of self-report which may lead to response bias or socially desirable answers. Besides, as discussed earlier, the survey did not measure the amount of sustainable food individuals consumed. This means exact differences in sustainable consumption between income groups could not be measured. Furthermore, gender could have been more evenly distributed between income groups. For low-income groups only 26% were male and for high-income groups 60% were male. Although it was added as a confounder in the analysis, it would have been better if this was more equally distributed because gender is shown to have an important role in the consumption of sustainable food (Mohr & Schlich, 2015; De Devitiis et al., 2012; Bulut et al., 2017; Von Meyer-Höfer et al., 2015).

When applying the TPB in this study only the control beliefs were taken into account. Some studies have shown that especially the subjective norm plays an important role in explaining green purchasing behavior (Liobikienė et al., 2016). This means that for future research it would be interesting to investigate the effect of subjective norms on making sustainable that is expensive. Besides that, creating knowledge about the impact of eating red and processed meat on the human health is shown to be an effective method in decreasing the consumption of meat (Clonan et al., 2016; Aertsens et al., 2009). Future research could thus be aimed at taking knowledge and subjective norms into account as explaining factor for purchasing sustainable food. If knowledge and norms influence the consumption of sustainable food, this could have implications for policymakers to change these norms and stimulate sustainable consumption. Although knowledge and norms have been widely researched in relation to sustainable consumption, to my knowledge this has not been done by dividing sustainable food choices into two different groups.

Besides that, future research might also try get better insight in the demographic differences in sustainable food purchasing by measuring the amount of food individuals consume instead of measuring whether they engage in sustainable food purchasing.

Another option might be, to do qualitative research to better understand motives behind the purchasing of sustainable food. Next to that, locally sourced products can also be seen as a form of sustainable consumption (Mohr & Schlich, 2015). For future research this is an item which could also be measured.

This study has some implications for practice. First of all, to meet the climate goals set in the Paris Agreement a change to a more sustainable diet can play an important role (Smith & Gregory, 2012). When governmental organizations know the factors that explain a sustainable food consuming pattern, they can make policies to promote a more sustainable food consumption pattern. Besides, a reduction in meat consumption will have a beneficial effect on health (McMichael et al., 2007).

Therefore, this knowledge can also contribute to a healthier society. Furthermore, the food industry and retailers will benefit from knowledge about sustainable food consumption behavior, because they can target specific groups. For example, in advertisements or in product development. As importance of food price has a mediating role in the relation between income and sustainable food that is expensive, it could help to change the price of sustainable food that is expensive to make it more attractive for consumers (Broeks et al., 2020). This could be done by lowering taxes on sustainable food that is expensive or for example by subsidizing farmers that work organic. This could lower the price of sustainable food that is expensive and make it more attractive to consumers.

The present study demonstrates that income is not significantly related to sustainable food consumption. Results imply that the importance individuals place on the price of food does have a mediating effect on the relation between income and sustainable food that is expensive. This has implications for policy makers, since they could promote sustainable behavior by affecting the price of food. Future research could focus on different explanatory factors for sustainable food consumption and could focus on measuring the amount of sustainable food individuals consume.

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## Appendix 1

### SPSS Syntax

```
DATASET ACTIVATE DataSet1.  
RECODE duurzaam1 duurzaam2 duurzaam3 duurzaam4 duurzaam5 duurzaam6 duurzaam7 duurzaam8  
duurzaam9  
  (2=0).  
EXECUTE.
```

```
DATASET ACTIVATE DataSet1.  
COMPUTE Financial_Scarcity=(Geldschaarste1 + Geldschaarste2 + Geldschaarste3 + Geldschaarste4) / 4.  
EXECUTE.
```

```
COMPUTE Sustainable_SAVE=(duurzaam6 + duurzaam7 + duurzaam8 + duurzaam9) / 4.  
EXECUTE.
```

```
COMPUTE Sustainable_COST=(duurzaam1 + duurzaam2 + duurzaam3 + duurzaam4 + duurzaam5) / 5.  
EXECUTE.
```

```
USE ALL.  
COMPUTE filter_$=(Sustainable_COST >= 0).  
VARIABLE LABELS filter_$ 'Sustainable_COST >= 0 (FILTER)'.  
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.  
FORMATS filter_$ (f1.0).  
FILTER BY filter_$.  
EXECUTE.
```

```
FILTER OFF.  
USE ALL.  
SELECT IF (Sustainable_COST >= 0).  
EXECUTE.
```

```
CROSSTABS  
  /TABLES=Sustainable_SAVE Sustainable_COST Financial_Scarcity belang_voeding6 BY inkomensgroep  
  /FORMAT=AVALUE TABLES  
  /CELLS=COUNT  
  /COUNT ROUND CELL.
```

```
DATASET ACTIVATE DataSet1.  
MEANS TABLES=Sustainable_SAVE Sustainable_COST Financial_Scarcity Geslacht Leeftijd opleiding_cat  
  belang_voeding6 BY inkomensgroep  
  /CELLS=MEAN COUNT STDDEV.
```

```
CROSSTABS  
  /TABLES=inkomensgroep BY opleiding_cat  
  /FORMAT=AVALUE TABLES  
  /CELLS=COUNT  
  /COUNT ROUND CELL.
```

```
CROSSTABS  
  /TABLES=inkomensgroep BY belang_voeding6  
  /FORMAT=AVALUE TABLES  
  /CELLS=COUNT  
  /COUNT ROUND CELL.
```



## Appendix 2

Output PROCESS v3.0 by Andrew F. Hayes.

Run MATRIX procedure:

\*\*\*\*\* PROCESS Procedure for SPSS Version 3.00 \*\*\*\*\*

Written by Andrew F. Hayes, Ph.D. [www.afhayes.com](http://www.afhayes.com)  
Documentation available in Hayes (2018). [www.guilford.com/p/hayes3](http://www.guilford.com/p/hayes3)

\*\*\*\*\*

Model : 4  
Y : Sustaina  
X : inkomens  
M : Financia

Covariates:  
Geslacht Leeftijd opleidin

Sample  
Size: 1055

\*\*\*\*\*

OUTCOME VARIABLE:  
Financia

Model Summary

R	R-sq	MSE	F	df1	df2	p
,5122	,2624	,8786	93,3611	4,0000	1050,0000	,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	4,2865	,1598	26,8289	,0000	3,9730	4,6000
inkomens	-,6446	,0369	-17,4594	,0000	-,7171	-,5722
Geslacht	-,1468	,0612	-2,3976	,0167	-,2670	-,0267
Leeftijd	,0025	,0028	,8832	,3773	-,0031	,0081
opleidin	,0000	,0037	,0135	,9893	-,0071	,0072

\*\*\*\*\*

OUTCOME VARIABLE:  
Sustaina

Model Summary

R	R-sq	MSE	F	df1	df2	p
,1171	,0137	,1096	2,9149	5,0000	1049,0000	,0128

Model

	coeff	se	t	p	LLCI	ULCI
constant	,4697	,0733	6,4121	,0000	,3260	,6135
inkomens	,0116	,0148	,7837	,4334	-,0175	,0407
Financia	,0082	,0109	,7542	,4509	-,0132	,0296
Geslacht	-,0721	,0217	-3,3249	,0009	-,1147	-,0296
Leeftijd	,0002	,0010	,1941	,8461	-,0018	,0022
opleidin	-,0018	,0013	-1,3931	,1639	-,0043	,0007

\*\*\*\*\* DIRECT AND INDIRECT EFFECTS OF X ON Y \*\*\*\*\*

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI
,0116	,0148	,7837	,4334	-,0175	,0407

Indirect effect(s) of X on Y:  
 Effect BootSE BootLLCI BootULCI  
 Financia -,0053 ,0072 -,0194 ,0091

\*\*\*\*\* ANALYSIS NOTES AND ERRORS \*\*\*\*\*

Level of confidence for all confidence intervals in output:  
 95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:  
 5000

NOTE: Variables names longer than eight characters can produce incorrect output.  
 Shorter variable names are recommended.

----- END MATRIX -----

Run MATRIX procedure:

\*\*\*\*\* PROCESS Procedure for SPSS Version 3.00 \*\*\*\*\*

Written by Andrew F. Hayes, Ph.D. www.afhayes.com  
 Documentation available in Hayes (2018). www.guilford.com/p/hayes3

\*\*\*\*\*

Model : 4  
 Y : Sustaina  
 X : inkomens  
 M : belang\_v

Covariates:  
 Geslacht Leeftijd opleidin

Sample  
 Size: 1055

\*\*\*\*\*

OUTCOME VARIABLE:  
 belang\_v

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	,3910	,1529	,6016	47,3857	4,0000	1050,0000	,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	3,6666	,1322	27,7342	,0000	3,4072	3,9261
inkomens	-,3282	,0306	-10,7437	,0000	-,3882	-,2683
Geslacht	-,2403	,0507	-4,7409	,0000	-,3397	-,1408
Leeftijd	,0043	,0024	1,8297	,0676	-,0003	,0089
opleidin	-,0005	,0030	-,1672	,8672	-,0064	,0054

\*\*\*\*\*

OUTCOME VARIABLE:  
 Sustaina

Model Summary

	R	R-sq	MSE	F	df1	df2	p
--	---	------	-----	---	-----	-----	---

,2115 ,0447 ,1179 9,8216 5,0000 1049,0000 ,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	,7064	,0770	9,1679	,0000	,5552	,8576
inkomens	,0140	,0143	,9798	,3274	-,0140	,0419
belang_v	-,0796	,0137	-5,8266	,0000	-,1064	-,0528
Geslacht	-,0144	,0227	-,6331	,5268	-,0589	,0301
Leeftijd	-,0014	,0010	-1,3882	,1654	-,0035	,0006
opleidin	,0014	,0013	1,0135	,3110	-,0013	,0040

\*\*\*\*\* DIRECT AND INDIRECT EFFECTS OF X ON Y \*\*\*\*\*

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI
,0140	,0143	,9798	,3274	-,0140	,0419

Indirect effect(s) of X on Y:

Effect	BootSE	BootLLCI	BootULCI
belang_v	,0261	,0052	,0162 ,0368

\*\*\*\*\* ANALYSIS NOTES AND ERRORS \*\*\*\*\*

Level of confidence for all confidence intervals in output:

95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:

5000

NOTE: Variables names longer than eight characters can produce incorrect output.

Shorter variable names are recommended.

----- END MATRIX -----