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The Effect of Social Comparison by Peers on Sustainable Consumption Behaviour among Dutch Adolescents when Receiving a Hypothetical Starting Capital: An Online Survey Experiment

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Abstract

An ongoing debate in the Netherlands about financial support for adolescents results in proponents who believe adolescents use financial resources sustainably out of self-responsibility and opponents who believe adolescents waste the financial resources on unsustainable purposes. This study looked at the influence of an educative nudge – in which sustainable consumption behaviour is conducted by peers with whom adolescents can socially compare – on the sustainable consumption behaviour and self-control of Dutch adolescents when receiving a hypothetical starting capital. Results showed that the educative nudge has a positive influence on the sustainable consumption behaviour of adolescents. Adolescents who received information of peers showing sustainable consumption behaviour spent more on sustainable consumption options. However, the influence of the educative nudge on self-control is ambiguous. Only when including relevant control factors the educative nudge does have a positive influence on the degree of self-control of adolescents. Considering the underlying sustainable consumption options that form together the concept of sustainable consumption behaviour, adolescents who received the educative nudge are more likely to save more as one of the underlying consumption options. These outcomes show adolescents make sustainable consumption decisions when receiving information about sustainable consumption behaviour through social influences of peers.

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1 Introduction

The question whether adolescents make rational/sustainable financial and consumption choices when this population group has self-responsibility over financial resources is a topic of much debate in the Netherlands. Several proponents of giving adolescents financial resources – just as Thomas Piketty which describes this in his economic writings *Le Capital au XXIe siècle* (Capital in the Twenty-First Century) (2014) *and Capital and ideology* (2020) – believe financial resources (i.e. a starting capital) could reduce opportunity inequality among young people (Piketty, 2014; Schimmelpenninck, 2023; Van Parijs, 1991). Moreover, proponents believe that the financial resources should be fully entrusted to adolescents, leaving adolescents free to decide on spending purposes (Van Parijs, 1991). This liberal perspective will lead to self-responsibility which cause adolescents to learn from their own experiences how to manage money sustainably (Schimmelpenninck, 2023). Piketty's plans has not gone unnoticed in the Netherlands either. Other economists and academia as well as various politicians and opinion leaders also cite Pikkety's plans. One example from politics is the proposition of the Dutch political party *Groenlinks* to give every Dutch youngster a starting capital of €10.000,- (Van Noije, Verbeek-Oudijk & De Haan, 2021). In addition, last January, Sander Schimmelpenninck – a famous opinion leader in the Netherlands – released his essay; *Sander en de brug – vijf voorstellen voor een eerlijker Nederland*. (*Sander and the bridge – five proposals for a fairer Netherlands*). One of those proposals relates directly to Piketty, with Schimmelpenninck also arguing for a starting capital with a height of €100.000,- – called a *'jubelton'* – in the Netherlands.

However – as already indicated at the beginning of this chapter – the plan to provide adolescents with financial resources under self-responsibility also has opponents. The widespread consensus in the Netherlands is that adolescents do not know how to handle money and waste large amounts of money on irrational/unsustainable purposes according to Schimmelpenninck (2023) who himself is in favour of providing a starting capital. An example which supports this consensus can be found in the publication of a news article by two correspondents Levin (2017) from *The Guardian* and De Vries (2017) from the Dutch newspaper *Metro* in which the lavish lifestyle of the current generation is addressed as a reason why young people cannot buy a house these days.

To determine whether adolescents spend financial resources (e.g. a starting capital) responsible instead of wasting it on unsustainable consumption good-and-services, it is necessary to look at adolescents' consumption behaviour to find out on what purposes adolescents spend money on (Banjeree, Nierhaus, & Suri, 2019). However, there may also be an alternative to invest in adolescents by providing a starting capital while ensuring that these adolescents do not waste the money on unsustainable consumer purposes. Currently, there are multiple studies on what impact different kinds of financial educative incentives (i.e. boosting/increasing skills regarding financial literacy) have on sustainable consumption behaviour (Amagir, Groot, Maassen van den Brink & Wilschut, 2020; De Beckker, De Witte & Van Campenhout, 2021). De Beckker et al. (2021) conducted research on consumption behaviour – by means of choice experiments and through improvement of students' financial literacy – but found no significant effects on improvements of sustainable and rational consumption behaviour. This is also supported by Amagir et al. (2020). De Beckker et al. (2021) recommend applying other financial education and targeted behavioural interventions within different consumption environments.

When influencing consumption behaviour and related choices, it is important to pay attention to certain errors within the cognitive processes (e.g. mental accounting & availability bias) that may cause adolescents to make unsustainable consumption decisions (AFM, 2021; Reisch & Zhao, 2017). To reduce these cognitive errors, several interventions can be used such as scenario analysis (Schirrmeister, Göring & Warnke, 2020), labelling/categorising (Zhang & Sussman, 2018) and financial education (Amagir et al., 2020). However, these interventions show that it is difficult to identify whether the intervention specifically reduces the cognitive error (Schirrmeister et al., 2020), or has a direct link with the desired economic outcome (Zhang & Sussman, 2018). It is also possible the intervention shows no significant effect as found by De Beckker et al. (2021). Another possibility that could influence consumption behaviour among adolescents towards greater rationality/sustainability is through the use of informative (i.e. educational) nudges (Franklin, Tolke & Roggeri, 2019; Hertwig & Grüne-Yanoff, 2017). Educative nudges could influence (consumption) decisions – and therefore consumption behaviour – when the application of the educative nudge is presented in an explicit way (AFM, 2021; Franklin et al., 2019). Sustainable consumption behaviour and related choices can potentially be improved when the information within educational nudge is presented by means of social comparison by peers (Franklin et al.,

2019). Previous studies related to making consumption choices within different contexts (e.g. education and environment issues) have shown that adolescents are sensitive to the social norms and behaviours of peers (AFM, 2021; Damgaard & Nielsen, 2018; Lehner, Mont & Heiskanen, 2016; Mosely & Stoker, 2013). This present study will focus on the effect of educative nudging – by providing information about sustainable consumption behaviour through social influences by peers – on the sustainable consumption behaviour of Dutch adolescents when they obtain a hypothetical starting capital.

The aim of the study is to examine whether Dutch adolescents who hypothetically receive and spend a starting capital show differences in sustainable consumption behaviour when nudged educationally regarding information about sustainable consumption behaviour by means of social comparison by peers – prior to making consumption choices. The expectation is that adolescents can be invested in with confidence if they are educationally nudged about sustainable consumption behaviour through social influences by peers. If there is evidence that investing in Dutch adolescents is possible by social influences of peers, policies can be made to provide more equal opportunities for every adolescent in the Netherlands applying financial support and behavioural economic techniques. In addition, this present study provides a starting point for further research about investing in Dutch youth through financial incentives and behavioural interventions. For this reason, the main research question of this study is: *What is the effect of educative nudging – in the form of providing information about sustainable consumption behaviour by means of social comparison by peers – on the sustainable consumption behaviour of Dutch adolescents when receiving a hypothetical starting capital?*

In addition, is the degree of self-control also considered as an important indicator in making sustainable and rational consumption choices (Barbić, Lučić, & Chen, 2019; Strömbäck, Linda, Skagerlund, Västfjäll & Tinghög, 2017). Therefore, this study will – additionally – look at the influence of the educative nudge on the degree of self-control of Dutch adolescents.

This study measured – by applying an online survey experiment (N=442) – the effect of an educative nudge on sustainable consumption behaviour and the degree of self-control of adolescents when receiving a hypothetical starting capital. It also examined the effect of the

educative nudge on the underlying sustainable consumption options – a total of five – that together form the concept of sustainable consumption behaviour. The educative nudge consists of showing information about sustainable consumption behaviour which is carried out by peers with whom adolescents can compare themselves. In this way, adolescents in the treatment group received (educational) information which is conveyed through social influence/comparison by peers. Additional to the treatment, relevant control variables (i.e. age, gender, studying/working, education level, income and wealth) were included. The study finds that the educative nudge has a positive influence on sustainable consumption behaviour. Adolescents who received the educative nudge spent more from the hypothetical starting capital on sustainable consumption goods. In addition, the findings of the educative nudge on self-control of adolescents are ambiguous. The educative nudge does not show an effect on the degree of self-control of adolescents in itself. When including relevant variables the educative nudge has a positive influence on self-control of adolescents. Considering the underlying consumption options, the study finds the educative nudge has a positive influence on the sustainable consumption option related to savings. Adolescents who received the treatment spent more on the sustainable consumption option savings in comparison to other sustainable consumption options. Additionally, when including the control variables, the study shows that the educative nudge has a significant negative effect on the sustainable consumption option regarding investing in an own (future) business. Without control variables, no significant result is found of the influence by the educative nudge on the amount adolescents spent on the sustainable consumption option related to investments in an own (future) business.

The next section, the second chapter, will consist of the literature overview of the various theoretical backgrounds that are relevant to this research. The third chapter is about the research question and hypothesis. Chapter four explains the research method. This section will focus on the design of the study by explaining the data collection and according methodology. Chapter five consists of the results arising from the statistical analysis of the data that is collected through the online survey experiment. The sixth chapter is about the discussion of this study which addresses the strengths and added value of this study, as well as the limitations and what opportunities or possibilities there are regarding future research. Chapter seven reflects the conclusion of this study.

2 Literature overview

2.1 The role of the starting capital

As mentioned earlier, providing adolescents with financial resources (e.g. a starting capital) – in which adolescents are given full responsibility over how it is spent – creates discussion. Providing a starting capital is not new and has its origins from the granting of a basic income. This basic income is a structurally repeated income that is given by a political community to all citizens of a country or community at individual level without any associated requirements or mandatory (work)activities (Bidadanure, 2019; Parijs, 2004). The various pro-and-counter arguments – which are the same as for the starting capital – show that a starting capital emerges from a basic income. For example, proponents believe that a basic income should make it possible to give (poor) people structural and easy access to certain basic needs (e.g. healthcare and nutrition) that can reduce extreme poverty (Banjeree et al., 2019). This example refers to actions regarding sustainable consumption decisions. On the contrary, proponents say that people who receiving a basic income become dependent on this income (Banerjee et al., 2019). In addition, people with a basic income should lack the incentive to actively participate in the labour market (Bidadanure, 2019). In the worst case scenario, recipients of a basic income would not know how to handle a rather large amount of money responsibly and spend it on drugs, partying or other licentious activities (Banjerjee et al., 2019). From these examples about the basic income, it can be seen where the arguments of proponents and opponents come from with regard to giving full responsibility over financial resources – in the form a starting capital – to adolescents.

2.2 Behavioural aspects, educative nudging & social comparison by peers

2.2.1 **Behavioural aspects regarding cognitive errors**

Several behavioural factors can play an important role when people have to make sustainable consumption choices but show unsustainable consumption behaviour. Namely, when people do make unsustainable consumption decisions or irresponsible choices, this can occur because of behavioural errors, also known as cognitive (emotional) errors. In other words, people are subject to certain heuristics or biases (AFM, 2021; Hertwig & Grüne-Yanoff, 2017; Reisch & Zhao, 2017). Common biases within making consumption decisions and showing corresponding behaviour are:

mental accounting (AFM, 2021; Thaler, 1999) and availability bias (AFM, 2021; Reisch & Zhao, 2017). In addition, the lack of self-control (self-efficacy) is also a common cognitive bias when making different consumption choices (AFM, 2021; Xiao & Porto, 2019). Self-control refers to the behaviour and therefore the control an individual has over their own decisions that pretends the individual from being tempted to choose the less favourable consumption good or service (Baumeister & Newman, 1994; Xiao & Porto, 2019). Taking a closer look at the cognitive process with respect to mental accounting, this refers to the ability of individuals to plan, track and evaluate financial activities (Thaler, 1999; Zhang & Sussman, 2018). When an individual is unable to act cognitively appropriated regarding this ability, errors occur. One way to overcome the cognitive errors within the mental accounting process is a plan in which individuals better track and control their spendings when this is categorised/labelled into different categories (e.g. food, entertainment, savings, housing etc.). In this way, individuals are more likely to limit their spendings on each category to the budget allocated to it beforehand (Reisch & Zhao, 2017; Thaler, 1999; Zhang & Sussman, 2018). In terms of availability heuristic, individuals make decisions (to) quickly based on information that first comes to mind (Reisch & Zhao, 2017). Information is therefore not analysed and processed accurately. Instead, individuals stick to simple rules or recent events out of ease (AFM, 2021; Reisch & Zhao, 2017; Schirrmeister et al., 2020; Kahneman, 2011, p.60). As a result, individuals may overestimate themselves leading to decisions with unfavourable outcomes (AFM, 2021). One way to reduce availability bias is by using scenario methods so individuals are urged to think more deeply about their future plans when making decisions which could lead to less quick impulsive decisions (Schirrmeister et al., 2020).

However, these interventions seem to have varying degrees of success in terms of targeting specific biases within cognitive processes, as well as examining the direct relationship/causality of the treatment and desired economic outcomes, as discussed in the introduction (Schirrmeister et al., 2020; Zhang & Sussman, 2018). Therefore, this study considers another intervention related to (educational) nudging which includes information about sustainable behaviour through social comparison by peers.

2.2.2 **The educative nudge through social comparison by peers**

Another intervention that can be used to potentially influence consumption decision and therefore behaviour are (educative) nudges or (short-term) boosts (Franklin et al., 2019; Hertwig & Grüne-

Yanoff, 2017). Nudging aims to an intervention in the choice architecture that changes people's behaviour in a predictable way to the desired behaviour without limiting the individual's choices and/or changing the individual's economic incentives. In addition, the intervention should be easy to avoid (Franklin et al., 2019; Hertwig & Grüne-Yanoff, 2017; Lehner et al., 2016). Nudges can consist of educative (e.g. information, reminders and warning labels) and non-educative nudges (i.e. exogeneous characteristics of the choice architecture of which people tell not to care to much about). As a result, nudges have been promoted as a promising tool in sustainable consumption issues because nudges do not restrict consumers' choice possibilities as much as other tools such as choice processing (Lehner et al., 2016). Because the present study is looking at sustainable consumption behaviour and related decisions – and educative nudges are aimed at influencing decisions and according behaviour – an educative nudge will be used.

In the attempt to influence sustainable consumption decisions, the educative nudge will consists of story-wise information about sustainable consumption behaviour including indicators related to social comparison by peers. This will be done by presenting the information about sustainable consumption behaviour more salient by referencing – in other words engaging – characters that adolescents can identify themselves with. In this way, the educational nudge contains social influences by making a comparison with the actions and behaviours of peers, allowing the nudge to potentially have a greater influence (Franklin et al., 2019). Previous studies related to decision-making issues in different contexts such as education and sustainable consumption behaviour – related to the environment – have applied these types of nudges (Damgaard & Nielsen, 2018; Lehner et al., 2016; Salazar, Oerlemans, van-Stroe Biezen, 2013). Individuals are highly influential by the social norms and behaviours of others around them and therefore adapt own actions to the actions and behaviours of others within the social environment (AFM, 2021; Damgaard & Nielsen, 2018; Lehner et al., 2016; Mosely & Stoker; 2013). Additionally, the educative nudge includes the component *Norms* from the MINDSPACE-model, which is a nudge related tool to deploy in various behavioural challenges in order to influence behaviour when making choices (Dolan, Hallsworth, Halpern, King, Metcalfe & Vlaev, 2012). As a result it is expected that the behaviours and actions of the peers in the recognisable story (i.e. educative nudge) serve as cues – which are related to the *Norm* component (Dolan et al., 2012) – that influence the behaviour of the adolescents when making consumption decisions.

By applying the educative nudge, this present study examines whether providing sustainable consumption information by means of social comparison by peers has a positive effect on sustainable consumption behaviour of Dutch adolescents. In addition, the study will examine whether the educative nudge also affects the degree of self-control – as an additional dependent variable – of the adolescents. This means the experimental approach in this present study contrasts to the study by De Beckker et al. (2021) in which consumption behaviour – in terms of critical purchase factors – has been attempted to be influenced by improving financial literacy. Nor does this study attempt to influence sustainable consumption behaviour and self-control by directly reducing errors within cognitive processes when making consumption decisions as attempted by Schirrmeister et al. (2020) and Zhang & Sussman (2018), but instead by looking at social influence/comparison by peers.

2.3 Consumption behaviour & decisions

2.3.1 **Sustainable consumption decisions**

What is understood by consumption behaviour and decision-making can vary and is very broad. This makes it difficult to determine what is exactly understood by (ir)responsible and/or (un)sustainable consumption behaviour and decisions. Or a better wording of both terms regarding this study would be *sustainable consumption decisions* and *unsustainable consumption decisions*.

A comprehensive meaning of *sustainable consumption decisions* could include the following activities, behaviours and/or attitudes: use of credit, money management, investing and saving, insurance and consumption management in financial products as well as in everyday activities (Barbić et al., 2019; Dew & Xiao, 2011). According to Barbić et al. (2019), sustainable financial and consumption decision-making is behaviour related to Maslow's theory. Following Maslow's theory, to consume responsible and improve financially, it is important for individuals to build consumption gradually and start with the basic needs to look at psychological and self-fulfilment needs from there (Barbić et al., 2019; McLeod, 2007). However, to do this, it is necessary for individuals to engage in sustainable consumption behaviours. This mainly involves financial and consumption behaviours such as saving and investing (De Beckker et al., 2021), contracting insurances (Barbić et al., 2019) and investing in real estate (Clark, 2014). Indeed, these behaviours affect which decisions people make regarding consumption. Additionally, these behaviours give

individuals the ability to make better informed consumption decisions – in other words, sustainable consumption choices – that match longer-term interests (Clark, 2014). This means that these behaviours contribute directly to making consumption choices and controlling impulsive buying (Baumeister, 2002).

However, not only from the studies about rational and sustainable financial/consumption behaviour do concrete sustainable consumption decisions (options) for adolescents follow. It is also important to look at what adolescents currently lack and need in the near future. The Sociaal Economische Raad (SER), gives in their report; *Hoge verwachtingen – Kansen en belemmeringen voor jongeren in 2019* (High expectations – Opportunities and barriers for young people in 2019), a number of recommendations that respond to these shortcomings and needs. According to the report of SER (2019), it is important that adolescents in the future have a chance to access appropriate further education (SER, 2019, p.162) and buying a first (own) home (SER, 2019, p.167). In addition, entrepreneurship is becoming an increasingly popular work activity among adolescents. The Netherlands is a well-performing country when it comes to support for entrepreneurship (such as laws and regulations and regional development agencies), but Dutch adolescents are not always able to reach this information properly (SER, 2019, p.166). These examples from multiple studies show that sustainable consumption behaviour comes from (financial) choices (e.g. insuring yourself and saving or investing) and activities related (future-orientated) opportunities (e.g. buying an own house, starting an own business and/or following educational courses).

2.3.2 **Unsustainable consumption decisions**

To describe *unsustainable consumption decisions,* reference can be made to conspicuous consumption. This means the public spending or the unconscious or conscious use of leisure activities and costly goods and services (Hammerl & Kradischnig, 2018). This mainly involves consumption of expensive goods and services and leisure activities in which social status, willingness to pay and display of wealth play an important role. This makes conspicuous consumption unnecessary and lavish (Hammerl & Kradischnig, 2018; Trigg, 2001). These types of consumption goods and their use are also known as Veblen's goods (Roy Chaudhuri, Mazumdar & Ghoshal, 2011; Hammerl & Kradischnig, 2018; Mason, 1984). Other previous studies with regards to conspicuous consumption indicates that it includes various products and services from the youth segments such as exclusive personals and fashion accessories (e.g. clothing and mobile

phones) (O'Cass & Frost, 2002; Shukla, 2008). Moreover, there are studies that give an insight into the consumption products-and-services students buy on a daily basis and reflects students' consumption behaviour-and-choices (Nibud, 2021; Tudose, 2019; Warnaar & van Praag, 1997). When it comes to concrete examples of the leisure and non-compulsory spending Dutch adolescent do, these studies talk about the following consumer goods-and-services: exclusive clothing and footwear, hygiene items (perfumes and make-up), (electronic) gadgets and accessories (phone case, speakers, TV etc.), recreation and entertainment (café, cinema, Netflix, theme park/zoo, day out, diner, etc.) and luxury (food) products (drinks/liquor, tobacco, sweets, etc.) (Nibud, 2021, p.26; Tudose, 2019; Warner & Van Praag, 1997).

The information from the literature on (un)sustainable consumption behaviour and associated decisions led to ten consumption options – of which are five sustainable consumption options and five are unsustainable consumption options. These consumption options will be used to measure the sustainable consumption behaviour of the Dutch adolescents. This is further explained in section *4 Methodology*.

2.4 The degree of self-control (additional dependent variable)

Because the lack of self-control is an important cognitive skill within sustainable consumption behaviour when making consumption choices (AFM, 2021; Xiao & Porto, 2019) this study examines whether the educative nudge also has an effect on the degree of self-control of Dutch adolescents. The importance of self-control is supported by the research of Barbić et al. (2019), Strömbäck et al., (2017) and Biljanovska & Palligkinis (2018) who found that self-control is one of the key indicators in making rational financial and consumption decisions. Various indicators (interventions) can help to improve self-control such as a warnings, a reminders or goal(s) setting (AFM, 2021; Biljanovska & Palligkinis, 2018). However, the educative nudge will not contain specific indicators that could potentially improve self-control to focus particularly on the effect of the social comparison by peers component. Additionally, the content of the educative nudge would become too long. Despite the educative nudge does not include targeted indicators that could improve self-control, the effect of the educative nudge on the degree self-control is examined. As a result, self-control is included as an additional dependent variable in this study. The effect of educational nudge on self-control is measured using one question in which the adolescents are

asked to indicate what percentage of the starting capital (€10.000,-) they would immediately spend in the first six months. A comprehensive explanation of this is given in section *4 Methodology*.

From the literature overview, the following visual overview of the main research questions examined in this present study can be presented;

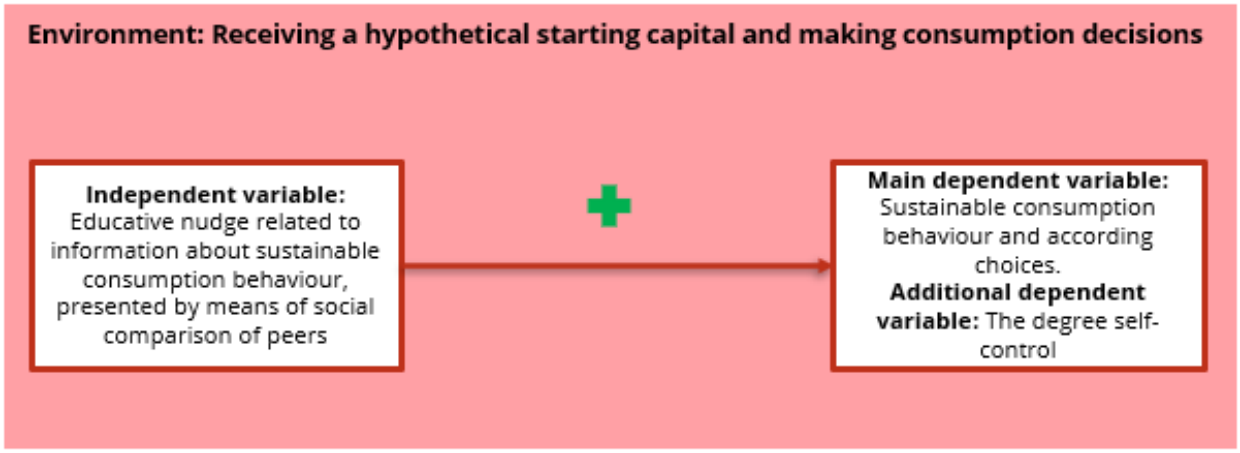

FIGURE 1: VISUAL OVERVIEW OF THE INDEPENDENT VARIABLE AND DEPENDENT VARIABLES

3 Research question & hypothesis

From the introduction and the literature overview, it can be concluded that there is a consensus in the Netherlands that Dutch adolescents can waste their money on unsustainable consumer goods and services when this target group is given full self-responsibility over financial resources. On the other hand, there are also proponents who believe that adolescents – in the form of a starting capital – should be financially supported and that adolescents should be given full self-responsibility over the financial resources. In this way, the adolescents will learn to consume sustainably while doing so. However, it has not yet been sufficiently researched whether Dutch adolescents show sustainable consumption behaviour by influence of educational nudging through social comparison of peers when they are given full self-responsibility over financial resources. For this reason, this study looks at the effect of educative nudging which includes providing information related to sustainable consumption behaviour by means of social comparison of peers on the consumption behaviour of Dutch adolescents when obtaining a hypothetical starting capital. This leads to the following main research question and hypotheses which this study aims to answer;

3.1.1 **Research question**

What is the effect of educative nudging – in the form of providing information about sustainable consumption behaviour by means of social comparison by peers – on the sustainable consumption behaviour of Dutch adolescents when receiving a hypothetical starting capital?

3.1.2 **The null hypothesis (H_0)**

The effect of educative nudging – in the form of information about sustainable consumption behaviour by means of social comparison of peers – has no effect on sustainable consumption behaviour among Dutch adolescents when they are receiving a hypothetical starting capital.

3.1.3 **The alternative hypothesis (H_A)**

The effect of educative nudging – in the form of information about sustainable consumption behaviour by means of social comparison of peers – has a positive effect on sustainable consumption behaviour among Dutch adolescents when they are receiving a hypothetical starting capital.

Besides looking mainly at the dependent variable sustainable consumption behaviour, this study also includes the issue whether the educative nudge positively affects the degree of self-control of Dutch adolescents. Indeed, according to the literature, the degree of self-control is an important cognitive skill when making consumption choices. In order not to make the educative nudge too large and to be able to look exclusively at the effect of the component that consists of providing information about sustainable consumption behaviour by means of social comparison by peers, no specific indicators are added to the educative nudge related to improving self-control. Although the educative nudge does not contain indicators that could directly improve self-control, this study includes self-control as an additional dependent variable. In this way this study also examine whether the educative nudge has an effect on the degree of self-control of Dutch adolescents when receiving a hypothetical starting capital. This leads to the following hypotheses for the additional dependent variable *self-control* which this study aims to answer;

3.1.4 **The null hypothesis of the additional dependent variable (H_0)**

The effect of educative nudging – in the form of information about sustainable consumption behaviour by means of social comparison of peers – has no effect on self-control of Dutch adolescents when they are receiving a hypothetical starting capital.

3.1.5 The alternative hypothesis of the additional dependent variable (H_A)

The effect of educative nudging – in the form of information about sustainable consumption behaviour by means of social comparison of peers – has a positive effect on self-control of Dutch adolescents when they are receiving a hypothetical starting capital.

4 Methodology

4.1 Method preparation

4.1.1 Research design & data

The design of the research is quantitative in nature, with the data (sample) of the study being collected through the application of an online survey experiment via the anonymous online survey tool named *Qualtrics*. The online survey is administered to students/adolescents of various Dutch secondary or tertiary education institutions (i.e. high school, vocational education college, university of applied sciences or university) for the most part. The choice to collect the data by means of an online survey is because an online survey can easily obtain a lot of data. Due to an online tool such as Qualtrics, many respondents – in this case adolescents – can be reached (Rowley, 2014). Another reason to conduct an online survey is because this method comes most across with the characteristics of a lab experiment. This means that in advance it is ensured that as many of the external factors outside the treatment and the context of this present study are excluded (Harrison & List, 2004). Moreover, laboratory experiments measure effects within behaviour in a more hypothetical and/or controlled way, making this type of study better applicable (AFM, 2021).

4.1.2 The online survey experiment

The online survey experiment divides – in other words randomize – the respondents into one control group and one treatment group. Through the application of the randomisation, it is possible to compare the effect of a treatment between a group of adolescents that underwent the treatment and a control group of adolescents that did not. Comparing the treatment group with the control group makes it possible to examine changes in behaviour due to the effect of the treatment, which makes this study an experiment. Therefore, choosing an experiment as the methodology for this research is the most convenient (Angrist & Pischke, 2010, p.1; AFM, 2021). Furthermore, randomisation is one of the most effective ways to prevent and minimize selection bias due to the

random assignment of adolescents into two identical groups (Kahan, Rehal & Cro, 2015). However, it is possible that attrition bias occurs during the data collection of an online survey experiment (Nunan, Aronson & Bankhead, 2018). To avoid attrition bias as much as possible, the online survey experiment is administered to adolescents during lectures or classes. Because adolescents are in class, there are fewer external factors present that could cause adolescents to drop out early while completing the survey. In addition, adolescents receive an additional incentive – in the form of a voucher of €20 – to motivate them not to withdrawal when completing the survey. Three vouchers worth €20 are distributed among the adolescents who complete the survey. Another important bias that can occur through the experimental method of this research is hypothetical bias. Hypothetical bias is the situation where the behaviour of individuals is inconsistent because the choices individuals make do not need to be justified in everyday practice (Fifer, Rose & Greaves, 2014; Hensher, 2010). Because the adolescents in this study do not receive the starting capital for real – but are asked to imagine the situation – the behaviour and corresponding choices may differ from a situation in which the adolescents receive a real starting capital. To minimise this hypothetical bias, a *cheap talk* description is implemented prior to making the consumption choices. The *cheap talk* description consists of a short sentence in the form of a reminder that states the adolescents should imagine the situation – in which a starting capital (€10.000,-) is received and choices have to be made in a given context – as realistically as possible (Fifer et al., 2014). Such cheap talk can have a positive impact on the reality of the data without actually influencing adolescents' behaviour or decisions (Hensher, 2010).

4.1.3 **Design of the treatment (educative nudge)**

By randomisation, adolescents are proportionally divided into a control and a treatment group. The treatment is the main independent variable in this study which consists of an educative nudge providing information about sustainable consumption decisions by means of social comparison by peers. As a result, the content of the treatment consists of a short recognisable story in which Dutch adolescents can identify themselves with two fictional characters. The treatment – in other words the content of the educative nudge – is shown below;

Sophie de Jong (27) and Ramon Kaya (27) have been good friends since childhood. Sophie recently received the keys to her first house (property value of € 320.000). After finishing secondary vocational education, she managed to complete a university of applied sciences bachelor at the age of 23. Because Sophie saved €300 of income every month through her side job from the age of 18, it was easier for her to apply for a mortgage when she wanted to buy a house. In contrast, her friend Ramon is currently unable to get a mortgage. Ramon mainly spent his income from previous side jobs on leisure goods-and-activities such as: luxury dinners, VIP concert tickets and TVs, phones and other electronics.

FIGURE 2: CONTENT OF THE TREATMENT (EDUCATIVE NUDGE)

In this short story two characters (Sophie and Ramon) show consumption behaviour and associated decisions. One of the characters (Sophie) makes sustainable consumption choices by taking financial decisions regarding future plans (i.e. savings of income and following a further education) and experiences the benefits of doing so (i.e. applying for a mortgage/buying a house). In addition, a short sentence describes the situation of the second fictional character (Ramon) who experiences the disadvantages of unsustainable consumption choices (i.e. not able to buy a house due to expenditures on leisure and pleasure goods). The situation the second character (Ramon) is now in, strengthens the first persons' choices (Sophie). Because the characters in the story are in the same stage of life as the adolescents in this study, they are peers. This allows the adolescents to compare themselves (social comparison) with the choices the characters make (social influence). The frame of the treatment is above all positive (Lehner et al., 2016). Previous research on environmentally sustainable consumption behaviour show mixed results regarding the observation of a significant effect when messages are positively or negatively framed (Florence, Fleischman, Mulcahy & Wynder, 2022). For this reason, the choice is made to apply only positive framing in the educational nudge so the result of the treatment can be attributed to only the positive frame. The content of the treatment (educative nudge) is shown again in Appendix (9.1.2).

4.1.4 **Design of the dependent variables**

After the adolescents in the treatment group have received the treatment, the adolescents answer the question measuring the effect of the educative nudge on sustainable consumption behaviour. The adolescents in the control group have not received the treatment and complete this question

directly. This question measures the overarching dependent variable of the study which consists of sustainable consumption behaviour by making sustainable or unsustainable consumption choices. The question consists of a fill-in question where the adolescents specify how many percentage of the starting capital (€10.000,-) they want to spend on one of the ten consumption options (Appendix 9.1.3). These ten consumption options are established from the literature in section *2.3 Consumption behaviour & decisions*. The literature has shown that consumption goods-and-services (options) can be distinguished between *sustainable consumption behaviour & choices* and *unsustainable consumption behaviour & choices*. Based on what other studies have examined, the concepts of sustainable consumption behaviour and choices and unsustainable consumption behaviour and choices includes the following consumption bundles – or in other words – consumption options;

Sustainable consumption options
1. Participating in a study/school or other educational course.
2. Investing in your own (future) business.
3. Saving in a bank account for later use.
4. Spending on/investing in a (future) own home.
5. Spending on various insurance companies for damages/accidents, theft and care, among others.
Unsustainable consumption options
1. Personal items such as: ((exclusive) clothing, footwear, perfume/shampoo/creams, jewellery etc.)
2. Transport goods and services such as: (car, scooter, motorcycle, boat, etc.).
3. Leisure activities such as: (concerts/festivals, pub/disco, travel)
4. Pleasure goods and services, such as: (dinners, drinks (liquor) and/or tobacco, etc.)
5. (Electronic) gadgets and other accessories (sound boxes, TVs, phones, etc.)

Of these ten consumption option, five consumption options consist of unsustainable consumption options and five consumption options consist of sustainable consumption options. The five sustainable consumption options form together the overarching dependent variable *sustainable consumption behaviour*. Separately, the five sustainable consumption options are each one underlying consumption option (underlying dependent variable). In the results, only the overarching dependent variable *sustainable consumption behaviour* and its associated underlying consumption options are presented because the focus of the study is about the effect of the educative nudge on sustainable consumption behaviour (and not on unsustainable consumption

behaviour). Moreover, choosing one consumption option excludes the possibility of choosing another consumption option because the amount can only be spent once. As a result, the spendings on unsustainable consumption options reflect the exact opposite of the spendings – and therefore the results – on sustainable consumption options. The method of measuring the overarching dependent variable is based on a study by Lührmann, Serra-Garcia & Winter (2015) (Appendix, 9.1.3). The question in this study differs slightly from the question in the study by Lührmann et al. (2015) regarding the choice of goods and services and the total amount of money adolescents have available for these options.

A second (fill-in) question – which directly follows the question regarding sustainable consumption behaviour – examine the effect of the educative nudge on the dependent variable *the degree of self-control*. The effect of the educative nudge on self-control is measured using one question in which the adolescents are asked to indicate what percentage of the starting capital (€10.000,-) they would immediately spend in the first six months (Appendix, 9.1.3). In this way, adolescents' self-control is measured by looking at the percentage that adolescents spend in the short term (within the first six months after receiving the starting capital). If adolescents spend more in the first six months, the self-control is lower. The question is based on previous research regarding different survey methods for measuring self-control (Ameriks, Caplin, Leahy & Tyler, 2007). In the study, Ameriks et al. (2007) tried to establish a number of different methods to measure self-control. However, the question in this current study does differ slightly from the original question as the question is adapted to the context of this study. In the original question, respondents were hypothetically allowed to spend dinner vouchers instead of a starting capital and were asked about spendings regarding the time period in the first year instead of the first six months (Appendix, 9.3.2).

Prior to completing both questions related to sustainable consumption behaviour and the degree of self-control, the adolescents receive financial resources in the form of a hypothetical starting capital (Appendix, 9.1.3). Although, according to the literature, a starting capital is closely related to a basic income, this study does not include a basic income. This is due to the fact that a the starting capital is unconditional and universal but not regular, which a basic income is (Bidadanure, 2019). The hypothetical starting capital in this study has therefore the same function as a basic endowment or financial grant (Van Parijs, 2004). The amount of the starting capital in this study is €10.000,-.

The argument for this choice is from the consideration that granting €10.000,- most closely matches reality since a Dutch political party – called *Groenlinks* – actually included this plan in one of its viewpoints (Van Noije et al., 2021).

4.1.5 **Design of the control variables**

Before the randomisation takes place and therefore the treatment is applied, adolescents are first questioned about various (descriptive) characteristics. This study controls for these characteristics (variables) because they may influence the effect of the treatment on the dependent variables. To identify and control for these characteristics, there is looked at other papers related to responsible/sustainable consumption behaviour and decision-making as well as papers about financial behaviour and literacy which are related to this study. The study asks and controls for the following characteristics: gender, age, studying or working, education level, monthly income and current saving capital (wealth).

The first two questions relate to the control variables *gender* and *age* because these personal characteristics could influence the relation between the treatment and sustainable consumption behaviour and therefore decisions (Stávková, Stejskal & Toufarova, 2008). Similarly, related studies such as De Beckker et al. (2021) and Chen & Volpe (1998) controlled for these variables. The control gender variable consists of 4 categories (1 = *male*, 2 = *female*, 3 = *other*, 4 = *don't want to say*). Previous studies show that women would be less rationally consistent in making financial decisions (Choi, Kariv & Müller, 2014). In addition, women appear to be less interested in financial/economic issues. This makes it harder for women to make ends meet at the end of each month and implies women are less good at saving compared to men (Lührmann et al., 2015). Regarding the control variable age, this study concerns adolescents/young adults as the target group. The age category of the target groups covers ages 14/15 up to and including 27-30 years old (Sawyer, Azzopardi, Wickremarathne & Patton, 2018). During this age phase important changes in terms of adulthood and making choices in further stages of life take place. The age phases are therefore divided into five classes: (1) 14-15, (2) 16-17, (3) 18-21, (4) 21-25 and (5) 26-27. From 16 years, adolescents make choices in the field of education such as choosing a further education or school profile. After that, from the age of 18, adolescents are given by law more freedom in making choices and responsibilities. When an adolescent turns 21, parents will no longer have child maintenance obligations. Finally when an adolescent turns 25, the adolescent phase ends and the

adolescent is classified as a young adult. The younger adolescents are still at the beginning of their careers and have therefore less knowledge and experience in making sustainable financial decisions (Chen & Volpe, 1998).

Question 3 is about whether the adolescents are *studying* or *working* as the target group can be representative in both sectors. The *level of education* is questioned in question 4. Knowledge and skills may differ for each adolescent because each adolescent could study at a different education level or participate in a different field which makes the adolescents obtain different competences which could affect consumption and financial behaviour (Amagir et al., 2020). This assumption is supported by research of Choi et al. (2014), which claims that an increase in educational level leads to more rational consumption and financial decisions. The question about education level is split so studying adolescents indicate what they are currently studying and working adolescents indicate what study they have completed. There are ten education levels included in this question, starting with *pre-vocational secondary education (basis)* and ending with *university (master)*. All levels are visible in Appendix (9.1.1).

The last two questions capture the socioeconomic status of each adolescent. Multiple studies control for this variable as income and wealth influence financial and consumption behaviour of individuals (De Beckker et al., 2021; Chen & Volpe, 1998; Ramya & Ali, 2016). The control variable *income* consists of six categories, starting with category (1) *(€0-€250)* up to and including (5) *(above €2.000)*. The last category is (6) (*don't want to say)* (Appendix 9.1.1). The control variable *wealth* is structured the same way but consists of seven categories, starting with category (1) *(€0-€1.000)* up to and including (6) *(above €25.000)*. The last category is (7) (*don't want to say)* (Appendix 9.1.1). Findings from other studies show that higher income causes an increase in sustainable consumption related to savings. Due to the increase in savings also wealth increases (Strömbäck et al., 2017; Biljanovska & Palligkinis, 2018). Warnaar & Van Praag (1997) show contradictory findings. The income of adolescents in recent years has become increasingly higher, but out of this also significantly more is spent on leisure activities. A representation of the overall flow of the research methodology is visible in Appendix (9.3.3).

4.1.6 **Formulation of the equations (models)**

To test whether educative nudging has an effect on sustainable consumption behaviour of adolescents when receiving a starting capital, the equation: $Y_{cd} = \beta_0 + \beta_1 T_i + \beta_2 X_i + \varepsilon_{i.}$ summarises this test. The extent to which a student shows sustainable consumption behaviour (Y_{cd}) is determined by: the starting capital which is included in the constant (β_0), whether the student has underwent treatment or not (T_i) and the various control variables (X_i) consisting of age, a dummy variable for gender (male=0, female=1), a dummy variable for studying/working (studying=0, working=1), education level, income and savings (wealth). The independent variable (T_i) is a dummy variable where the number *(0)* represents adolescents in the control group and *(1)* represents adolescents in the treatment group. To test which of the five underlying sustainable consumption option – of the overarching dependent variable – the treatment might have a significant effect on, regression analyses are also done for each of the five sustainable consumption options as dependent variables separately. The equations of these underlying consumption options are the same as for the overarching dependent variable, however the dependent variable in the equation changes for each of the five underlying sustainable consumption options. In doing so, for each equation, (Y_{cd}) is replaced by: following an education (Y_e), insurances (Y_i), own business (Y_b), own house/home (Y_h) and savings (Y_s). To examine whether the educative nudge have also an effect on the additional dependent variable of self-control among adolescents when receiving a hypothetical starting capital, the equation: $Y_{sc} = \beta_0 + \beta_1 T_i + \beta_2 X_i + \varepsilon_i$ summaries this test. Again, the extent to which a adolescent shows self-control (Y_{sc}) is determined by the same independent variables as for the dependent variable sustainable consumption behaviour.

4.2 Method application

4.2.1 **Application of the online survey experiment**

The administration of the online survey experiment took place during the period from 1 May till 19 May 2023. A total of 575 adolescents participated, of which 74 did not complete the survey. As a result, 501 surveys were completed by the adolescents. Of these 501 adolescents, (N=9) adolescents belonged to the *gender* categories (3 = *other* & 4 = *don't want to say*). Since these categories consist of relatively few adolescents and are not of interest for the analysis of the study, the categories were excluded from further data analysis. In terms of *income*, (N=10) adolescents chooses for the category (6 = *don't want to say*). This category is not of interest for the data analysis

and is therefore left out. Also *wealth* contained a number of adolescents (N=49) within the category (7 = *don't want to say*). Similarly, this category was not included in the data analysis. This resulted in a final sample size of (N=442). The distribution of the survey to adolescents took place through multiple channels. Most of the adolescents were contacted by a teacher where the adolescents are educated by or through communication by word-of-mouth. A very small proportion was contacted through social media.

4.2.2 **Statistical measurements for analysing the data**

For reliable and valid analysis of the results, it is important that the concepts of sustainable consumption and unsustainable consumption behaviour are reliably and validly measured. When adolescents make a choice to spend a certain percentage on a consumption option, this excludes the possibility of spending the same percentage on another consumption option which creates ipsative data. The problem with ipsative data is that the correlation between items of a concept are unreliable. The correlations are – due to the ipsative character of the data – sometimes low and negative while positive correlations were expected (Closs, 1996; Meade, 2004). For this reason, in this study calculating reliability via Cronbach's alpha and/or performing factor analysis for validation of a concept is not possible because the reliability and factor analysis are based on correlations between indicators (items) of a concept (Heo, Kim & Faith, 2015). Instead, validation of the concept regarding sustainable consumption behaviour is supported by using the interrater reliability. This indicates to what extent raters (judges) agree that the five items (options) of sustainable consumption behaviour actually measure the (overarching) concept of sustainable consumption behaviour and to what extent raters agree that the five options of unsustainable consumption behaviour actually measure unsustainable consumption behaviour. In this way, the validity of both concepts is tested.

Above all, this study is interested in the effect of the treatment on sustainable consumption behaviour (the overarching dependent variable) when the adolescents receiving a hypothetical starting capital. In addition, the effect of the treatment on the additional dependent variable self-control is also examined. To test these questions and hypotheses, first, a description of all variables is presented. Second, a randomization check is performed by applying the chi-square tests. The chi-square test is used to check whether the distribution of adolescents for each control variable do not differ significantly from each other with respect to the treatment and control group. Should this

not be the case, the randomisation of that particular control variable is – by chance – unsuccessful. Since all control variables are represented in classes, the chi-square test is applied to test randomisation. However, Ordinary Least Squares (OLS) are conducted to model the results. OLS-models follow the assumption that the error terms of the data are normally distributed. Looking at the graphs in Appendix (9.4.4), it cannot be said with certainty whether the error terms of the data of both dependent variables – especially those of self-control – are normally distributed. To account for this assumption, a non-parametric Mann-Whitney U-test is applied in addition to the chi-square test (Appendix, 9.4.4). To test the hypotheses, an independent sample t-test is conducted to test if a significant difference exists between the two means of the control and treatment control group after application of the treatment. This test measures whether there is a significant difference between adolescents in both groups with regard to the means of the dependent variables (i.e. sustainable consumption behaviour and self-control). By using simplified and multivariate OLS-regression models, the effect of treatment on sustainable consumption behaviour and self-control is examined by controlling for the various control variables. OLS-models also measure the effect of the treatment on each underlying dependent variable (the five sustainable consumption options) also including the control variables. Because the equation is linear, an OLS-regression model is the model that is most suited for continuous data of this study (Wooldridge, 2010, p.49). Furthermore, it is important to take into account possible other assumptions from the OLS-regression models regarding heteroscedasticity and multicollinearity. To test for the presence of heteroskedasticity, Breusch-Pagan tests are applied for each model, which show that multiple models tested significantly for the presence of heteroskedasticity. Results of the Breusch-Pagan tests can be found in Appendix (9.4.2). For this reason, all regression models include robust standard errors to control for heteroscedasticity (Wooldridge, 2010, p.57). For this purpose, the HC3 method is used for correcting heteroskedasticity (Long & Ervin, 2000). The Variance Inflation Factor (VIF) of each independent variable is an indication for the degree of multicollinearity. Values below 5 are acceptable values indicating absence of multicollinearity (Studenmund, 2017, p.252).

To check for robustness of the OLS-regression models, other regression models are constructed with recoded dependent variables. In doing so, the original continuous dependent variables are recoded into categorical dependent variables by means of dummy variables. This robustness check is not applied to all models. For the models that answer the main question and hypotheses of this

study (i.e. *Sustainable behaviour1*, *Sustainable behaviour1*, *Self-control1* and *Self-control2*) a robustness check is applied. Also the models of the underlying sustainable consumption options -- for which the treatment has a significant effect on – are assessed for robustness (Appendix, 9.4.6).

5 Results

First, the interrater reliability is presented. Second, the descriptive statistics of all control, independent and dependent variables included in this research method has been given. It also describes – when necessary – which control variables have been recategorized which made the analysis of the control variables more applicable. Third, the balance check – a check for randomization – is showed. Fourth, the main question about the effect of the treatment on sustainable consumption behaviour and self-control is answered with the independent sample t-test. Additionally, the regression of the treatment on the sustainable consumption behaviour is tested by – excluding and including – control variables. This is repeated for the degree of self-control of adolescents. To check which of the five underlying consumption options are responsible for a possible significant effect of sustainable consumption behaviour, for each of the five consumption options regression analyses are given. This section also describes – whenever required – the findings of the robustness checks and how OLS-assumptions have been taken into account.

5.1 Interrater reliability

The interrater reliability is expressed in the intraclass correlation coefficient (ICC). For this reason, an additional survey was administered in which respondents were asked to indicate the extent to which they believe each consumption option – out of the ten sustainable and unsustainable consumption options – belongs to a sustainable consumption good and/or service. Respondents were asked to indicate the value using a Likert scale (consisting of the scales: 1 = *disagree* up to and including 5 = *agree*) (Appendix, 9.4.1). The survey was administered from 22 May to 27 May 2023 and yielded a number of 11 respondents[1].

[1] The sample size for applying the interrater reliability is rather small.

TABLE 1: INTERRELATED RELIABILITY

	N_{rators}	Intraclass Correlation Coefficient (ICC)
Sustainable consumption options	11	0.821
Unsustainable consumption options	11	0.737

The interrater reliability of the five sustainable consumption options for the (overarching) concept sustainable consumption behaviour is 0.821. The value of the interrater reliability is within the rule of thumb of (0.8-1) and can therefore be classified as 'good' (Evers, Lucassen, Meijer & Sijtsma, 2010). The interrater reliability for the five unsustainable consumption options for the concept unsustainable consumption behaviour is 0.737. The interrater reliability is also within the rule of thumb of (0.6-0.8) and can therefore be classified as 'acceptable' (Evers, et al., 2010).

5.2 Descriptive statistics

Table 2 summarizes in two parts – a and b – all control, independent and dependent variables included in this study. Table 2a shows all control variables and the independent variable. For each control variable, the distribution of adolescents across categories or classes is shown. Regarding the independent variable (the treatment), Table 2a shows how many adolescents received the treatment and not. Table 2b shows averages in percentage of the spendings/savings of the starting capital on the various underlying consumption options.

TABLE 2A: DESCRIPTIVE OF ALL CONTROL VARIABLES

Variable	Category/Class	N(%)
Control variables		
Gender	Male	198 (44.8%)
	Female	244 (55.2%)
Total Gender		**442 (100%)**
Age	14-15	10 (2.3%)
	16-17	106 (24.0%)
	18-21	155 (35.1%)
	22-25	146 (33.0%)
	26-27	25 (5.7%)
Total Age		**422 (100%)**
Studying/Working	Yes	387 (87.6%)
	No	55 (12.4%)
Total S/Y		**422 (100%)**
Education level	Low	17 (3.9%)
	Middle	157 (35.5%)
	High	268 (60.6%)
Total Education		**442 (100%)**
Income	€0-€250	83 (18.8%)
	€250-€500	105 (23.8%)
	€500-€1.000	131(29.6%)
	€1.000-€2.000	58 (13.1%)
	Above €2.000	65 (14.7%)
Total Income		**442 (100%)**
Wealth	€0-€1.000	112 (25.3%)
	€1.000-€2.500	78 (17.6%)
	€2.500-€5.000	62 (14%)
	€5.000-€10.000	83 (18.8%)
	€10.000-€20.000	65 (14.5%)
	Above €20.000	43 (9.7%)
Total Wealth		**442 (100%)**
Independent variable - Treatment		
Treatment	Yes	213 (48%)
	No	229 (52%)
Total Treatment		**442 (100%)**

With respect to *gender*, adolescents in this study are composed of slightly more females at 55.2%. For *Age*, most adolescents in the this study are in the age group (3) which is (18-21, 35.1%). The vast majority of the adolescents in this study is a student (87.6%) looking at the control variable *studying or working*. The control variable *education level* have been recategorized during the data analysis of the study. First, the control variable education level consisted of ten different classes, but is recoded to 3 classes according to the CBS *Standaard Onderwijsdeling* (2022) in order to have a build-up in level between all classes. The classes (1 = *pre-vocational secondary education* (*basis*)) & (2 = *pre-vocational secondary education* (*kader*/*mixed*/*theoretical*)) have become class (1 = *low*). The classes (3 = *senior general secondary education* (*havo*)), (4 = *pre-university education* (*vwo*)) and (5 = *vocational education college* (*mbo*)) have become class (2 = *middle*). The classes (6 = *associate degree* (*AD*)), (7 = *university of applied sciences* (*bachelor*)), (8 = *university of applied sciences* (*master*)), (9 = *university* (*bachelor*)) and (10 = *university* (*master*)) have become class (3 = *high*). With a percentage of 60.6%, most adolescents in this study have a high level of education. Looking at *income*, most adolescents are in the income group (3) which is (€500-€1.000, 29.6%). When it comes to *wealth*, most adolescents in this study have an amount of wealth between €0 - €1.000 (category 1, 25.3%).

TABLE 2B: DESCRIPTIVE OF DEPENDENT VARIABLES & UNDERLYING CONSUMPTION OPTIONS

Dependent variable	**Mean(%)**
Overarching dependent variable[a]	
Sustainable consumption behaviour	**63.30%**
Additional dependent variable[b]	
Self-control	**73.45%**
Underlying dependent variables	
sustainable consumption behaviour[c]	
Option 2: Education	**9.31%**
Option 5: Insurance	**3.01%**
Option 6: Business	**5.54%**
Option 8: Home/House	**12.48%**
Option 10: Savings	**32.97%**

NOTE: TABLE 2B SHOWS ALL AVERAGES OF THE SPENDINGS/SAVINGS ON THE DEPENDENT VARIABLES. THE AVERAGES REPRESENT THE AMOUNT OF PERCENTAGE OF THE STARTING CAPITAL THE ADOLESCENTS HAVE SPENT/SAVED REGARDING THE DEPENDENT VARIABLES. IN CHRONOLOGICAL ORDER: FIRST IS (A) THE OVERARCHING DEPENDENT VARIABLE SHOWN WHICH REFERS TO HOW MUCH PERCENT FROM THE STARTING CAPITAL THE ADOLESCENTS SPENT ON AVERAGE ON THE SUSTAINABLE UNDERLYING CONSUMPTION OPTIONS COMBINED. SECONDLY, THE TABLE IS ABOUT (B) THE ADDITIONAL DEPENDENT VARIABLE SELF-CONTROL WHICH REPRESENTS HOW MUCH PERCENT FROM THE STARTING CAPITAL THE ADOLESCENTS HAVE SAVED ON AVERAGE WITHIN THE FIRST SIX MONTHS. THIRD, THE TABLE SHOWS (C) THE UNDERLYING SUSTAINABLE CONSUMPTION OPTIONS AND THE AVERAGE AMOUNT FROM THE STARTING CAPITAL THE ADOLESCENTS SPENT ON ONE OF THE UNDERLYING SUSTAINABLE CONSUMPTION OPTIONS.

With respect to the overarching dependent variable *sustainable consumption behaviour*, adolescents spent an average of 63.30% on sustainable consumption options. Regarding the additional dependent variable *self-control*, adolescents saved 73.45% on average. Looking at the different underlying sustainable consumption options, adolescents spent: 9.31% regarding following an *education,* 3.01% related to *insurances*, 5.54% related to investments in an own *business*, 12.48% related to investments in an own *home* and 32.97% related to *savings* from the starting capital.

5.3 Balance check (check for randomisation)

Table 3 firstly shows how the adolescents were distributed across classes or categories within all control variables. In addition it also shows how many adolescents from each class or category within a control variable were assigned to the treatment or control group. Second, Table 3 shows whether randomisation was successfully applied in the research method, measured by the chi-square (χ^2(df)) and corresponding p-value.

TABLE 3: OVERVIEW CONTROL VARIABLES ON TREATMENT & RANDOMIZATION CHECK BY CHI-SQUARE

Control Variable	Category/Class	Treatment	Control	Chi-square χ^2(df))		p-value
				Chi-square value	*Critical value*	
Gender	Male	98 (49.5%)	100 (50.5%)			
	Female	115 (47.1%)	129 (52.9%)			
Total Gender		**213 (48.2%)**	**229 (51.8%)**	**χ^2(1)=0.245**	**2.71**	**0.621**
Age	14 – 15	8 (80.0%)	2(20.0%)			
	16 - 17	49 (46.2%)	57 (53.8%)			
	18 - 21	80 (51.6%)	75 (48.4%)			
	22 – 25	64 (43.8%)	82 (56.2%)			
	26 - 27	12 (48.0%)	13 (52.0%)			
Total Age		**213 (48.2%)**	**229 (51.8%)**	**χ^2(4)=6.053**	**7.78**	**0.195**
Studying/Working	Studying	186 (48.1%)	201(51.9%)			
	Working	27 (49.1%)	28 (50.9%)			
Total S/W		**213 (48.2%)**	**229 (51.8%)**	**χ^2(1)=0.020**	**2.71**	**0.886**
Education	Low	10 (41.2%)	7 (58.8%)			
	Middle	80 (51.0%)	77 (49.0%)			
	High	123 (45.9%)	145 (54.1%)			
Total Education		**213 (48.2%)**	**229 (51.8%)**	**χ^2(2)=1.816**	**4.61**	**0.403**
Income	€0-€250	42 (50.6%)	41 (49.4%)			
	€250-€500	52 (49.5%)	53 (50.5%)			
	€500-€1.000	61 (46.6%)	70 (53.4%)			
	€1.000-€2.000	25 (43.1%)	33 (56.9%)			
	Above €2.000	33 (50.8%)	32 (49.2%)			
Total Income		**213 (48.2%)**	**229 (51.8%)**	**χ^2(4)=1.181**	**7.78**	**0.881**
Wealth	€0-€1.000	51 (45.5%)	61 (54.5%)			
	€250-€500	40 (51.3%)	38 (48.7%)			
	€2.500-€5.000	28 (45.2%)	34 (54.8%)			
	€5.000-€10.000	41 (49.4%)	42 (50.6%)			
	€10.000-€20.000	31 (48.4%)	33 (51.6%)			
	Above €20.000	23 (53.5%)	20 (46.5%)			
Total Wealth		**213 (48.2%)**	**229 (51.8%)**	**χ^2(5)=1.231**	**9.24**	**0.942**

In the last column of Table 3 no significant differences are found between the treatment and control group for the control variables: gender (p=0.621), age (p=0.195), studying/working (p=0.886), education level (p=0.403), income (p=0.881) and wealth (p=0.942). All p-values are greater than 0.10 indicating that randomisation was successfully applied across all control variables. At the same time, it can be seen that also all chi-square values of each control variable do not exceed the corresponding critical value as shown in Table 3. This result is in line with the result according to

the p-values. To determine the critical values of the chi-square values, *Table B-6 The Chi-square distribution* of Studenmund (2017, p.547) was used. The result of the chi-square test – regarding no significant differences between the two groups – is also confirmed by the non-parametric Mann-Whitney U-test (Appendix 9.4.4).

5.4 Analysis of main results

5.4.1 **Main results of sustainable consumption behaviour and self-control**

Table 4 shows, first, the means and the standard deviations for the treatment and control group. Second, the t-test for two independent samples is used to test whether the treatment group differs from the control group for the dependent variables *sustainable consumption behaviour* and the *degree of self-control*. Both p-values – for one-sided and two-sided t-tests – are presented. Because the hypotheses are formulated one-sided – educative nudging has a positive effect on sustainable consumption and self-control – the t-tests are one-sided and therefore the one-sided p-values are correct for this test.

TABLE 4: COMPARISON CONTROL & TREATMENT GROUP DEPENDENT VARIABLES & INDEPENDENT SAMPLE T-TEST

	Comparison control-and treatment group				**Independent sample t-test**		
	Treatment (N=213)		Control (N=229)		t (440)	p-value	
	Mean	*St. Dev.*	*Mean*	*St. Dev.*		*One-sided*	*Two-sided*
Sustainable consumption behaviour	65.30(%)	22.638	61.44(%)	24.520	-1.716	0.043	0.087
Self-Control	75.33(%)	22.688	71.70(%)	26.153	-1.553	0.061	0.121

NOTE: WITH RESPECT TO THE HYPOTHESES WHICH ARE DIRECTED ONE-SIDED, THE RESULTS FROM THIS TABLE WILL BE TESTED ONE-SIDED AT THE 0.05 LEVEL.

On average, adolescents in the treatment group spend 65.30% on sustainable consumption options compared to adolescents in the control group who spend 61.44% on those. The spendings of adolescents on sustainable consumption options in the treatment group compared to the spendings of adolescents in the control group is significant with a p-value of 0.043 and lower than the critical p-value 0.05. For self-control no significant difference was found, the p-value is 0.061 (one-sided) which is greater than the critical p-value of 0.05.

Table 5 shows the simplified regression model excluding control variables and the multivariate regression model including control variables of the (overarching) dependent variable *sustainable consumption behaviour* and the dependent variable *self-control*.

TABLE 5: LINEAR REGRESSION MODELS OF SUSTAINABLE CONSUMPTION BEHAVIOUR & SELF-CONTROL

Dependent variables: Sustainable consumption behaviour & The degree of self-control								
	Exclusive control variables				*Inclusive control variables*			
Model	**Sustainable behaviour1**		**Self-control1**		**Sustainable behaviour2**		**Self-control2**	
	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value
(Constant)	61.443*** (1.624)	<0.001	71.699*** (1.732)	<0.001	31.851*** (6.791)	<0.001	60.048*** (7.010)	<0.001
Treatment (ref=control)	3.861+ (2.248)	0.087	3.628 (2.330)	0.120	4.288+ (2.189)	0.051	3.920+ (2.316)	0.091
Gender (ref=male)					-1.083 (2.331)	0.642	3.263 (2.562)	0.204
Age					3.129 (2.066)	0.130	0.847 (2.219)	0.703
Studying/Working (ref=studying)					6.944* (3.480)	0.047	-2.422 (4.509)	0.591
Education					4.980+ (2.789)	0.075	4.388 (2.909)	0.132
Income					-1.669 (1.299)	0.199	-2.853* (-2.046)	0.041
Wealth					1.712* (0.696)	0.014	1.053 (0.839)	0.210
Number of observations	442		442		442		442	
R^2/Adj. R^2	R-squared=0.007		R-squared=0.005		Adj. R^2= 0.066		Adj. R^2= 0.021	

NOTE: SUSTAINABLE BEHAVIOUR1 REPRESENTS THE REGRESSION MODEL WITH ROBUST STANDARD ERRORS WHICH MEASURED THE EFFECT OF THE TREATMENT ON THE DEPENDENT VARIABLE SUSTAINABLE CONSUMPTION BEHAVIOUR. SELF-CONTROL1 IS THE REGRESSION MODEL WITH ROBUST STANDARD ERRORS AND MEASURED THE EFFECT OF THE TREATMENT ON THE ADDITIONAL DEPENDENT VARIABLE SELF-CONTROL. SUSTAINABLE BEHAVIOUR3 CONSISTS OF THE REGRESSION MODEL WITH ROBUST STANDARD ERRORS WHICH EXAMINED THE EFFECT OF THE TREATMENT AND THE CONTROL VARIABLES ON THE DEPENDENT VARIABLE SUSTAINABLE CONSUMPTION BEHAVIOUR. SELF-CONTROL2 REPRESENTS THE REGRESSION MODEL WITH ROBUST STANDARD ERRORS AND EXAMINED THE EFFECT OF THE TREATMENT AND THE CONTROL VARIABLES ON THE ADDITIONAL DEPENDENT VARIABLE SELF-CONTROL. ROBUST STANDARD ERRORS IN PARENTHESES → HC03 METHOD: *** P < 0.001, ** P < 0.01, * P < 0.05, + P < 0.10.

Model *Sustainable behaviour1* is the simplified regression model in which the treatment is the independent variable and sustainable consumption behaviour the dependent variable. The effect of the treatment with an unstandardized regression weight (B) of 3.861 – without controlling for control variables – has a p-value of 0.087. This result corresponds to the t-test in Table 4 which shows a two-sided p-value of 0.087 and a one-sided p-value of 0.043. Because the regression analysis in Table 5 only shows two-sided p-values, this p-value must be divided by 2 to get the same one-sided p-value as in Table 4. The p-value of 0.087 is significant for a critical p-value of 0.10 (two-sided) (p=0.043 one-sided and significant at the 0.05 level). This indicates that there is a positive effect between the treatment and the amount spent on sustainable consumption options, which leads to result 1.

Result 1	The educative nudge that consists of social comparisons by peers has a significant positive effect on the sustainable consumption behaviour of adolescents.

Model *Self-control1* consists of the simplified regression model in which the treatment is the independent variable and self-control the dependent variable. The regression weight of the treatment on self-control is 3.628 with a p-value of 0.120. This result corresponds to the t-test in Table 4 which shows a two-sided p-value of 0.121 and a one-sided p-value of 0.060 (when divided by 2). The effect of the treatment on self-control is not significant, which means the treatment has no significant effect on self-control of adolescents. This gives result 2.

Result 2	The educative nudge that consists of social comparison by peers has no significant effect on the degree of self-control of adolescents.

Model *Sustainable behaviour2* is the multivariate regression model including the six control variables. The treatment has a positive effect with a (B) of 4.288 (p=0.051) and is significant at the 0.10 level (p=0.0255 one-sided and significant at the 0.05 level). Compared to model *Sustainable behaviour1* the effect the treatment increased somewhat, but the result stays the same which means adolescents who received the treatment spent significantly more on sustainable consumption options after controlling for the six control variables. The control variables *studying/working* and *wealth* have a significant effect at the 0.05 level with regression weights of 6.944 and 1.712

respectively. The control variable *education level* has a significant effect at the 0.10 level with a regression weight of 4.980. This indicates that working, a higher education level and more wealth are associated with more sustainable consumption behaviour. Model *Self-control2* is comparable with model *Self-control1* but now all the control variables are included next to the independent variable which is the treatment. The regression weight of the treatment is 3.920 and significant at the 0.10 level with (p=0.091) (p=0.046 one-sided and significant at the 0.05 level). The effect of the treatment increased somewhat in comparison with model *Self-control1*. In addition, the treatment shows now a significant effect on self-control in model *Self-control2*. The control variable *income* has a significant effect on self-control with a (B) of -2.853 at the 0.05 level. This indicates that adolescents with a higher income shows less self-control. This leads to result 3.

Result 3	The educative nudge that consists of social comparisons by peers has a significant positive effect on self-control of adolescents when controlling for the control variables.

Although, the four regression models show significant results, the explained variances – given by the R-squared – of the regression models are low. The R-squared for model *Sustainable behaviour1* and *Self-control1* are 0.007 and 0.005 respectively which means less than 1% of the variance in the dependent variables regarding sustainable consumption behaviour and self-control is explained by the treatment. For the regression models *Sustainable behaviour2* and *Self-control2* are 6.6% and 2.1% of the variances explained by the independent and control variables.

Because multicollinearity may occur when applying simplified and multivariate regression models, a VIF-analysis is generated for all independent variables in this study (Appendix, 9.4.3). These VIF-analysis show no significant values, meaning no independent variables are explained by other variables in the various models. No VIF-values can be observed that exceeds the lower bound – the collinearity tolerance value – and the upper bound (the rule of thumb at the value of 5). This means there is no multicollinearity between the independent variables.

5.4.2 **Results of the underlying sustainable consumption options**

Table 6a shows a summary of all averages indicating the percentage adolescents in both groups spent on the underlying sustainable consumption options.

TABLE 6A: DESCRIPTIVE STATISTICS UNDERLYING SUSTAINABLE CONSUMPTION OPTIONS

	Treatment (N=213)		**Control (N=229)**	
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*
Option 2: Education	10.16%	14.371	8.51%	13.885
Option 5: Insurance	3.04%	4.702	2.98%	4.701
Option 6: Business	4.69%	9.549	6.34%	14.091
Option 8: Home/House	11.38%	18.597	13.50%	19.877
Option 10: Savings	36.02%	26.248	30.12%	26.999

Adolescents in the treatment group spent on average: 10.16% on following education, 3.04% on insurances, 4.69% on investments in an own (future) business, 11.38% on investments in an own (future) home/house and 36.02% on savings. In comparison, adolescents in the control group spent on average: 8.51% on following education, 2.98% on insurances, 6.34% on investments in an own business, 13.50% on investments in an own home/house and 30.12% on savings.

Table 6b shows the most important results of the effect of the treatment on the amount adolescents have spent on the underlying sustainable consumption options. This means that Table 6b contains results of the models where the treatment has a significant effect on a particular underlying consumption option. A total overview and complete explanation of all – including minor – results is shown in Appendix (9.4.5). Significant results were found for the underlying consumption options related to investments in an own business and savings. Therefore the simplified models – *Business1* and *Savings1* – excluding the control variables and the multivariate models – *Business2* and *Savings2* – including the control variables, are presented in Table 6b. As no directed hypotheses were formulated for the effect of the treatment on the various underlying sustainable consumption options, the test for two-sided p-values are kept and followed.

TABLE 6B: LINEAR REGRESSION MODELS UNDERLYING CONSUMPTION OPTIONS (INVESTMENTS IN BUSINESS & SAVINGS)

Underlying consumption options related to investments in an own business and savings.								
	Exclusive control variables				*Inclusive control variables*			
Model	**Business1**		**Savings1**		**Business2**		**Savings2**	
	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (R. St. Err.)	p-value	Coeff. (R. St. Err.)	p-value
(Constant)	6.336*** (0.933)	<0.001	30.122*** (1.788)	<0.001	20.139*** (4.130)	<0.001	8.211 (7.885)	0.298
Treatment (ref=control)	-1.646 (1.141)	0.150	5.903* (2.539)	0.021	-1.965+ (1.113)	0.078	6.117* (2.512)	0.015
Gender (ref=male)					-3.681** (1.201)	0.002	-0.314 (2.635)	0.905
Age					0.704 (1.325)	0.595	2.166 (2.320)	0.351
Studying/Working (ref=studying)					3.981 (2.681)	0.138	1.230 (4.957)	0.804
Education					-4.489** (1.603)	0.005	4.294 (3.297)	0.193
Income					-0.205 (0.776)	0.792	-2.321+ (1.322)	0.080
Wealth					-0.821* (0.392)	0.036	3.103*** (0.809)	<0.001
Number of observations	442		442		442		442	
R^2/Adj. R^2	R-squared=0.005		R-squared=0.012		Adj. R^2= 0.077		Adj. R^2= 0.052	

NOTE: THE MODELS (BUSINESS1 AND SAVINGS1) CONSIST OF SIMPLIFIED REGRESSIONS AND MEASURED THE EFFECT OF THE TREATMENT ON THE AMOUNT ADOLESCENTS SPENT ON THE UNDERLYING SUSTAINABLE CONSUMPTION OPTIONS RELATED TO INVESTMENTS IN AN OWN BUSINESS AND SAVINGS, RESPECTIVELY. THE MODELS (BUSINESS2 AND SAVINGS2) CONSIST OF THE MULTIVARIATE REGRESSION MODELS AND MEASURED THE EFFECT OF THE TREATMENT INCLUDING CONTROL VARIABLES ON THE AMOUNT ADOLESCENTS SPENT ON THE SUSTAINABLE CONSUMPTION OPTIONS RELATED TO INVESTMENTS IN AN OWN BUSINESS AND SAVINGS, RESPECTIVELY.
ROBUST STANDARD ERRORS IN PARENTHESES → HC03 METHOD; *** P < 0.001, ** P < 0.01, * P < 0.05, + P < 0.10.

Model *Business1* is the simplified regression model in which the treatment is the independent variable and the underlying consumption related to investments in an own business the dependent variable. The effect of the treatment with a regression weight of -1.646 is not significant. This indicates that the treatment has no effect on the amount adolescents spent on investments in an own business, from which result 4 follows.

Result 4 The educative nudge that consists of social comparisons by peers has no effect on the amount adolescents spent on the sustainable consumption option related to investments in an own business.

Model *Savings1* consists of the simplified regression model in which the treatment is the independent variable and the underlying consumption option related to savings the dependent variable. The effect of the treatment on savings is with a (B) of 5.903 significant at the 0.05 level. This means that the treatment has a significant positive effect on the amount adolescent spent on the consumption option related to savings. For this reason, result 5 can be formulated.

Result 5 The educative nudge that consists of social comparisons by peers has a significant positive effect on the amount adolescents spent on the sustainable consumption option related to savings.

Model *Business2* is the multivariate model which includes the six control variables. The treatment shows a significant negative effect with a regression weight of -1.965 at the 0.10 level. Compared to model *Business1* the effect of the treatment became somewhat more negative. In addition, the treatment has now a significant negative effect on the consumption option related to investments in an own business. This means the treatment has a significant negative effect on the amount adolescents spent on investments in an own business after controlling for all control variables. The control variables *gender* and *education level* have a significant negative effect with regression weight of -3.681 and -4.489 respectively at the 0.01 level. The control variable *wealth* has a significant negative effect at the 0.05 level with a regression weight of -0.821. This indicates that being female, a higher education level and more wealth are negatively correlated with the consumption option related to investments in an own business. From this, result 6 can be formulated.

Result 6 The educative nudge that consists of social comparisons by peers has a significant negative effect on the amount adolescents spent on the sustainable consumption option related to investments in an own business when controlling for all control variables.

Model *Savings2* is comparable with model *Savings1* but now all control variables are included as well as the independent variable which is the treatment. The treatment has a regression weight of 6.117 and is significant at the 0.05 level. The effect of the treatment increased somewhat compared with model *Savings1* but the result stays the same which means the treatment has a significant positive effect on the amount adolescents spent on the consumption option related to savings. The control variable *income* has a significant negative effect with a (B) of -2.321 at the 0.10 level. The control variable *wealth* has a positive regression weight of 3.103 and is significant at the 0.001 level with ($p<0.001$). More income is negatively and more wealth is positively associated with the sustainable consumption option related to savings.

Despite the models regarding the underlying consumption options have found significant results, the explained variances of the models are low. The independent variable – the treatment – only explains less than 1% of the variances for the models *Business1* and *Savings1*. Regarding the models *Business2* and *Savings2* the adjusted R-squared values improved to (0.077) and (0.052) respectively which indicates that all the independent variables in the multivariate models explains the variance better compared to the independent variable in the simplified model, but remain low.

5.4.3 **Robustness checks**

As a robustness check, the dependent variables of all the models in the main result sections *5.4.1* and *5.4.2* are recoded from continuous data to categorical data by means of dummy variables. By calculating the average amount the control and treatment group spent – or saved in the case of self-control – on each dependent variable, a cut-off point is determined to create new categories (dummies) for the regression models that check for robustness. As a result, new regression models with the recoded dependent variables were conducted to test the original OLS-regression models fromm the sections *5.4.1* and *5.4.2* for robustness. The main significant differences compared to the original OLS-regression models from the main results are shown in this section. A full overview and detailed explanation of how the dependent variables were recoded and of all the significant differences with regard to the original OLS-regression models are presented in Appendix (9.4.6).

Looking at the simplified robustness check model *Sustainable behaviourRC1* there are no differences compared to the original OLS-model *Sustainable behaviour1* (Appendix 9.4.6). This means the treatment has a significant positive effect on the amount adolescents spent on sustainable

consumption options. However, the simplified model *Self-controlRC1* that checks the original OLS-model *Self-control1* for robustness shows a significant positive effect with a regression weight of 0.077 (p=0.097) at the 0.10 level (p=0.049 one-sided and significant at the 0.05 level) (Appendix 9.4.6.). This indicates – compared to model *Self-control1* – that the treatment has a significant positive effect on self-control of adolescents. The robustness check models which includes all control variables – *Sustainable behaviourRC2* and *Self-controlRC2* – show the same results regarding the significance of the treatment compared to the original OLS-models *Sustainable behaviour 2* and *Self-control2*. This indicates that that the treatment has a positive significant effect on the amount spent on sustainable consumption options and on the degree of self-control of adolescents, when controlling for the control variables. In addition, the significance level of the effect of the treatment on sustainable consumption behaviour in model *Sustainable behaviourRC2* increased from the 0.10 to the 0.05 level in comparison to the original model *Sustainable behaviour2* (Appendix 9.4.6).

Taking into account the simplified models – *BusinessRC1* and *SavingsRC1* – as robustness checks for the original OLS-models *Business1* and *Savings1* respectively, no differences regarding the significance level of the treatment occur. This means the treatment has no effect on the amount adolescents spent on the sustainable consumption option related to investments in an own business, but the treatment still has a significant positive effect on the amount adolescents spent on the sustainable consumption option related to savings. The robustness check model *BusinessRC2* which includes all six control variables shows no significant effect of the treatment on the amount adolescents spent on the underlying sustainable consumption option relates to investments in an own business. This is contradictory to the result of the original OLS-model *Business2* in which the treatment shows a significant negative effect on the amount adolescents spent on the consumption option related to investments in an own business. The robustness check model *SavingsRC2* shows no differences regarding the effect of the treatment in comparison to the original OLS-model *Savings2*. This means the result stays the same which implies the treatment has a significant positive effect on the amount adolescents spent on the sustainable consumption option regarding savings when including control variables.

6 Discussion

6.1 Discussion of results

In this section, the main results from chapter *5 Results* are discussed and explained in relation to the literature. The first result shows that the first hypothesis of the study – which indicates that the educative nudge has a significant positive effect on the sustainable consumption behaviour of Dutch adolescents when receiving a hypothetical starting capital – is supported. Adolescents in the treatment group spent 3.86% (i.e. 65.30% - 61.44%) more on sustainable consumption options compared to adolescents in the control group (see Table 4). This corresponds to the regression weight of 3.861 in the regression analysis that shows the adolescents who received the educative nudge spent significantly more on sustainable consumption goods-and-services. This result supports the literature about the effect of behavioural economic interventions, in which adolescents can be influenced explicitly by displaying information – in other words educational – nudges regarding sustainable consumption behaviour (Damgaard et al., 2018; Hertwig & Grüne-Yanoff, 2017; Lehner et al., 2016). In addition, this result also supports the literature arguing that adolescents are subject to social influences/comparisons of peers and adjust their consumption behaviour accordingly (Damgaard et al., 2018; Franklin et al., 2017; Lehner et al., 2016; Salazar et al., 2013).

It can be inferred from the *Results* section that the second and third result contradict each other. The treatment has a regression weight of 3.628 (p=0.120 two-sided and p=0.060 one-sided) and is not significant according to the simplified regression model *Self-control1*. This suggest that the educative nudge has no significant effect on the degree of self-control of adolescents (result 2). However, after controlling for the six control variables the educative nudge has a significant regression weight of 3.920 (p=0.091 two-sided) at the 0.10 level on self-control (p=0.046 one-sided and significant at the 0.05 level) (result 3). It is notable that the p-values on which both results are based are close to the critical p-value of 0.05 (one-sided), which substantiates the contradictory result and makes it difficult to make an unambiguous conclusion. For this reason, it is with some difficulty to determine whether the educational nudge actually makes a significant contribution to the degree of self-control of adolescents. However, because the control variables show no

significant differences between the control and treatment group – as shown in the randomisation check (Table 3) – result 2 is the most interesting regarding this study. Looking at other literature, self-control – as a behavioural factor – is an important indicator of sustainable/financial consumption behaviour. In addition, the importance of other factors for making sustainable/financial consumption choices (e.g. attitude and financial knowledge) are also mentioned by Barbić et al. (2019). These findings suggest that – when making consumption decisions – self-control is not a factor in itself. However, this says nothing about the effectiveness of the educative nudge on self-control of adolescents and why the effect does have a significant effect when control variables are taken into account. Further research is necessary to identify whether multiple factors are responsible for self-control as self-control itself also influences sustainable financial/consumption behaviour in combination with other factors according to the literature.

A noteworthy result when considering the results of the underlying sustainable consumption options is the significant effect of the educative nudge on savings. Adolescents receiving the educative nudge spent – from the hypothetical starting capital – significantly more on the underlying sustainable consumption option related to savings (result 5). Moreover, the content of the educative nudge includes sentences that explicitly assumed that the character (Sophie) can get a mortgage for a house because, among other things, money from income has been saved every month (Appendix, 9.1.2.). This suggests that the adolescents that received the treatment included the specific information from the educative nudge in their considerations of what the starting capital would be spent on. At the same time, this again assumes – as with the first result – that showing information about sustainable consumption behaviour through social influences/comparison by peers has an effect on the amount adolescents spent on savings (Damgaard et al., 2018; Franklin et al., 2017; Lehner et al., 2016).

A second ambiguous result relates to the effect of the educative nudge on the amount adolescents spent on the underlying consumption option related to investments in an own business. Again – just as with results 2 and 3 – the treatment in itself has no significant effect on the amount adolescents spent on the sustainable consumption option related to investments in an own business (result 4), however when including control variables the treatment shows a significant negative

regression weight of -1.965 at the two-sided 0.10 level (result 6). These findings are not in line with the literature regarding the report of the *Sociaal Economische Raad* (SER). From this report it appears that having or starting an own business is becoming an increasingly popular employment sector among adolescents. Therefore, the expectation is that adolescents view investing in an own business as a sustainable financial/consumption option. Although having a positive attitude towards starting an own business is not a direct reason why the educative nudge has no or a negative effect on investing in a (future) own business. An explanation for the effect of the treatment can be given with regard to the content of the treatment. The content of the educative nudge does not contain explicit information about the benefits of doing investments in an own business as it is explicitly displayed for the consumption option related to savings. Despite the fact that the educative nudge does not contain targeted content on the consumption option related to investing in an own business, it is difficult to explain why the treatment shows a significant negative effect including the control variables because the content of the treatment does not contain disadvantages about having an own business. However, this significant negative effect disappears when the model from which this result is generated – *Business2* – is controlled for robustness. The multivariate robustness check model *BusinessRC2* shows no significant effect of the treatment on the amount adolescents spent on investments in an own business.

Besides the main results, salient smaller results were found regarding the control variables which were included to control for the relation between the treatment and sustainable consumption behaviour. *Wealth* as a control variable is significantly positively associated with sustainable consumption behaviour but also with the underlying consumption option related to savings. These results are supported by previous research showing that savings and wealth have a positive relationship (Strömbäck et al., 2017; Biljanovska & Palligkinis, 2018). To accumulate wealth, income sources are needed, but the control variable *income* shows a significant negative relationship with self-control and the consumption option related to savings. This is not in line with previous findings of Strömbäck et al. (2017) and Biljanovska & Palligkinis (2018) who see the increase in income as an important factor in wealth accumulation. However, this does correspond to the contradictory findings of Warnaar & Van Praag (1997). From this study, it is argued that adolescents who earning a higher income spend significantly more on leisure activities and can therefore save less.

6.2 Strengths, limitations and future research

One of the greatest strengths of this study, is that the study contributes to the debate on the sustainable consumption behaviour of adolescents when this target group is given self-responsibility over financial resources. Findings from this study can reinforce the debate with results that adolescents can make sustainable consumption choices when adolescents are informatively – in other words educationally – nudged by displaying sustainable consumption behaviour performed by peers with whom adolescents can compare themselves socially. Indirectly, these findings contribute to the argument for supporting adolescents financially to reduce opportunity inequality. When adolescents make sustainable consumption decisions and receive a behavioural economic intervention – such as an educational nudge aimed at social comparison through peers – this supports the argument for financially supporting adolescents to reduce opportunity inequality.

The main limitation of this study is that the effect of the treatment is difficult to assign to a single indicator. The educative nudge aims to make adolescents make more sustainable consumption decisions by showing information about sustainable consumption behaviour performed by peers. However, as a result, the educative nudge contains two indicators that are combined, with information on sustainable consumption behaviour on one side and social influences/comparisons by peers on the other. More treatment groups are needed to measure the effect of each individual indicator of the educative nudge on sustainable consumption behaviour and the degree of self-control of adolescents. In addition, a similar limitation is present related to the content – in other words the given information – of the treatment. The content of the educational nudge contains explicit (educative) sentences that emphasise certain underlying sustainable consumption options related to the benefits of following an education and savings (Appendix, 9.1.2). As a result, the educative nudge shows a significant effect on the underlying sustainable consumption option related to savings. However, the educational nudge do not contain explicit information about the benefits of the other sustainable consumption options (e.g. insurances & having an own business). It is not known whether explicit information about other underlying consumption options would have led to a different results. Again, multiple treatment groups are needed to measure the effect of explicit information on each sustainable consumption option separately. However, including

multiple treatment groups is undesirable for measuring possible significant effects within this study as this study is underpowered with the current sample size (Appendix, 9.2.1).

The data of the study is self-reported and therefore administered at adolescents in the region – mostly during classes – to reduce attrition and limited insights of the process of the survey. Although, this limited the generalizability of the data of the study because the survey is not administered equally among adolescents throughout the Netherlands. Additionally, the adolescents in this study receive a starting capital hypothetically. To bring the situation where adolescents receive financial resources and are allowed to spend these freely closer to reality, *cheap talks* have been used. However, it is doubtful whether adolescents would make the same choices if a real starting capital had been provided. Moreover, the r-squared value of this study is low, this suggests that there are multiple factors (i.e. explanatory variables) explaining the variance of the dependent variables, but these are not included in this study.

Future research could examine the environment of receiving a starting capital in a more real-life setting. This could involve creating situations where adolescents have the opportunity – or experience the feeling – of actually spending some form of starting capital. Applying gamification in combination with behavioural economics insights could provide opportunities in this. In addition, it is interesting to explore whether treatments containing one indicator have an effect on sustainable consumption behaviour and self-control of adolescents. This also holds for applying treatments that contain explicit content or information about a particular sustainable consumption option. Furthermore, this also includes applying different underlying sustainable consumption options to measure the concept of sustainable consumption behaviour.

7 Conclusion

There is an ongoing debate within the Netherlands with proponents on one side arguing adolescents should be financially supported and that adolescents should be given full self-responsibility of the financial resources (i.e. a starting capital) they receive. In this way, sustainable consumption behaviour will follow from experience and self-confidence due to the financial support. With these financial resources, opportunity inequality could be reduced. On the other hand, opponents believe

that adolescents are unable to handle financial resources responsibly and waste the financial resources on unsustainable consumption purposes.

This study contributed to the content of this debate by looking at the effect of an educative nudge on sustainable consumption behaviour and the degree of self-control of adolescents. In this study the choice is made not to look explicitly at interventions that reduce cognitive biases which are at play when making consumption choices. Instead, this study has examined the effect of an educative nudge which consists of providing information about sustainable consumption behaviour performed by peers with whom adolescents can compare themselves. As a result, an online survey experiment is used to measure the effect of the educative nudge on the sustainable consumption behaviour of adolescents when receiving a hypothetical starting capital. In addition, as self-control is an important behavioural indicator of sustainable consumption behaviour, the effect of the educative nudge on the degree of self-control of adolescents is also examined. Moreover, the effect of the educative nudge on the amount adolescents spent – from the hypothetical starting capital – on each of the underlying sustainable consumption options, is also analysed. Together, these underlying consumption options form the concept of sustainable consumption behaviour.

This study concluded that an educative nudge consisting of information about sustainable consumption behaviour performed by peers with whom adolescents can socially compare, has a significant positive effect on the amount adolescents spent on sustainable consumption goods. However, the effect of the educative nudge on the degree of self-control is ambiguous. The educative nudge shows a significant effect on self-control of adolescents when relevant control variables are controlled for, but the educative nudge has no significant effect when these control variables are not included. Considering the underlying sustainable consumption options, this study shows that the educative nudge has a positive significant effect on the amount adolescents spent – from the hypothetical starting capital – on the sustainable consumption option related to savings. However, the effect of the educative nudge on the amount adolescents spent on the underlying sustainable consumption option related to investments in an own business, is ambiguous. When relevant control variables are included, the educative nudge has a significant negative effect on the amount adolescents spent on the sustainable consumption option related to investments in an own business. Without control variables the educative nudge shows no significant result.

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9 Appendix

9.1 Content of the survey and treatment

First the sections of the online survey experiment are presented in Dutch. The English translation is shown per section or per question below.

9.1.1 **Introduction question (control variables)**

Introductory text

Introductory text

Dear participant,

Thank you for taking time to complete this survey and being available to do so. Completing the entire survey will take about 5 minutes. The purpose of this survey is to gain insight into the consumption behaviour of adolescents in the Netherlands. Below are some questions about your personal details (gender, age, etc.) followed by two fill-in questions. Please read the information and questions carefully before answering. It is also important that you answer all questions honestly. This survey is conducted under the responsibility of Radboud University Nijmegen. This means that your anonymity will be guaranteed at all times and that given answers will not be provided to third parties under any circumstances.

PLEASE NOTE: When you complete the survey, you will have a chance of winning a voucher worth €20.

Thank you very much in advance for your participation!

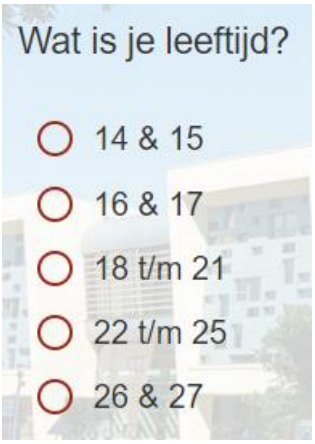
Vraag 1

Question 1

Wat is your gender?	
Male	

Female	
Other, namely	
I would rather not say	

Vraag 2



Question 2

What is your age?	
14 & 15	
16 & 17	
18 up to and including 21	
22 up to and including 25	
26 & 27	

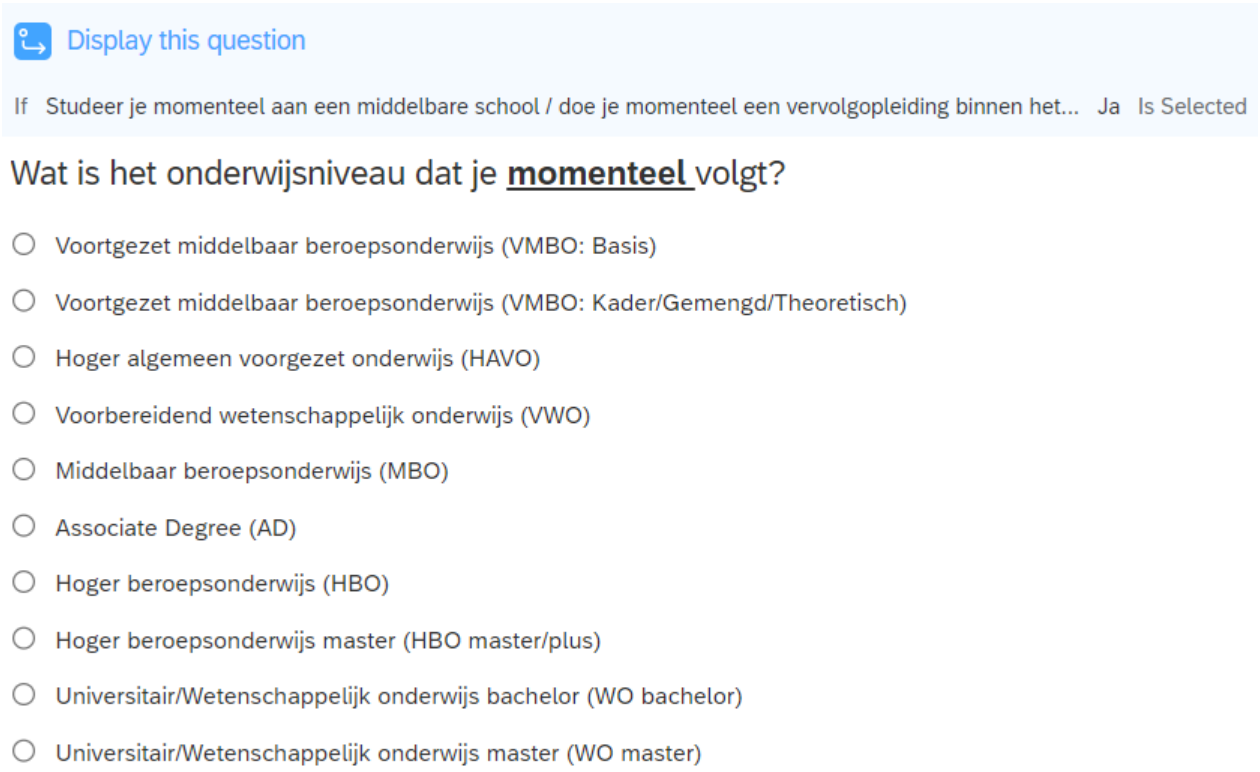
Vraag 3

Question 3

Are you currently studying at a secondary school / doing follow-up education within mbo, hbo or wo?

(If any of the above options is the case, please select 'Yes')	
Yes	
No	

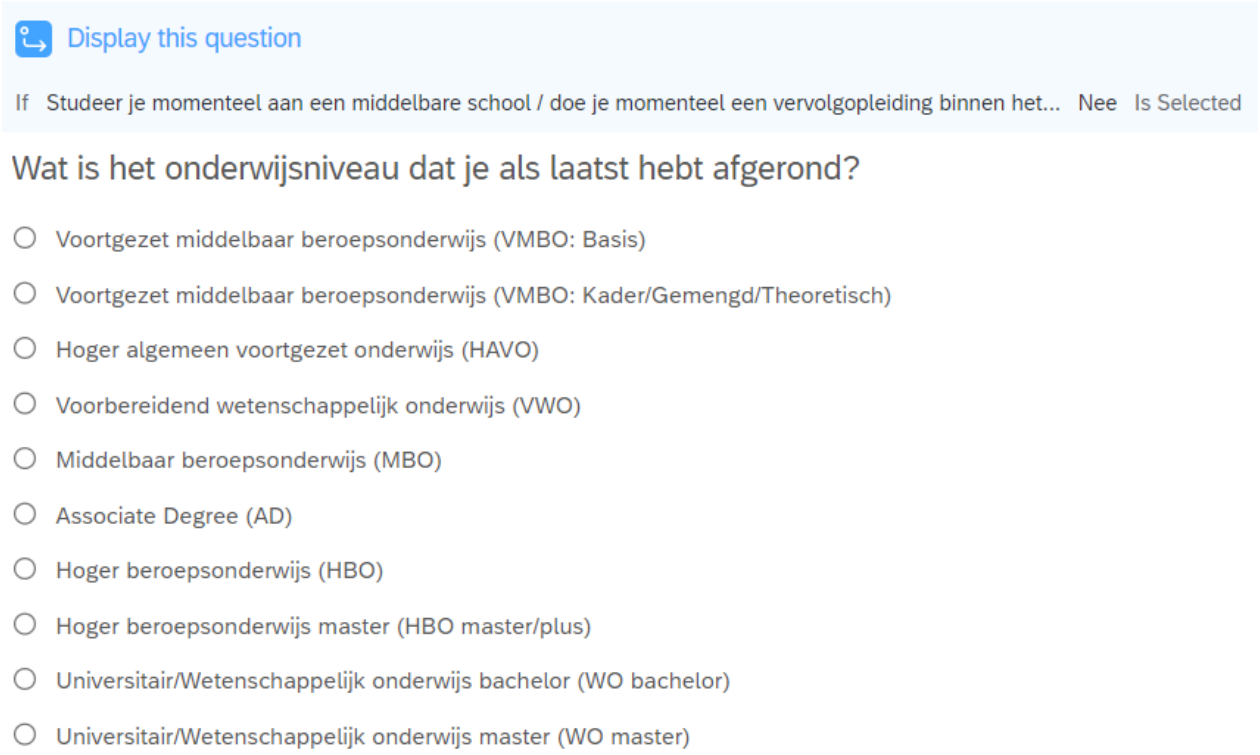
Vraag 4a



Question 4a

What is the level of education you are currently attending?	
Pre-vocational secondary education (Basis)	
Pre-vocational secondary education (Kader/Mixed/Theoretical)	
Senior general secondary education (Havo)	
Pre-university education (Vwo)	
Vocational education college (MBO)	
Associate Degree (AD)	
University of applied sciences (HBO-bachelor)	
University of applied sciences (HBO-master)	
University (WO-bachelor)	
University (WO-master)	

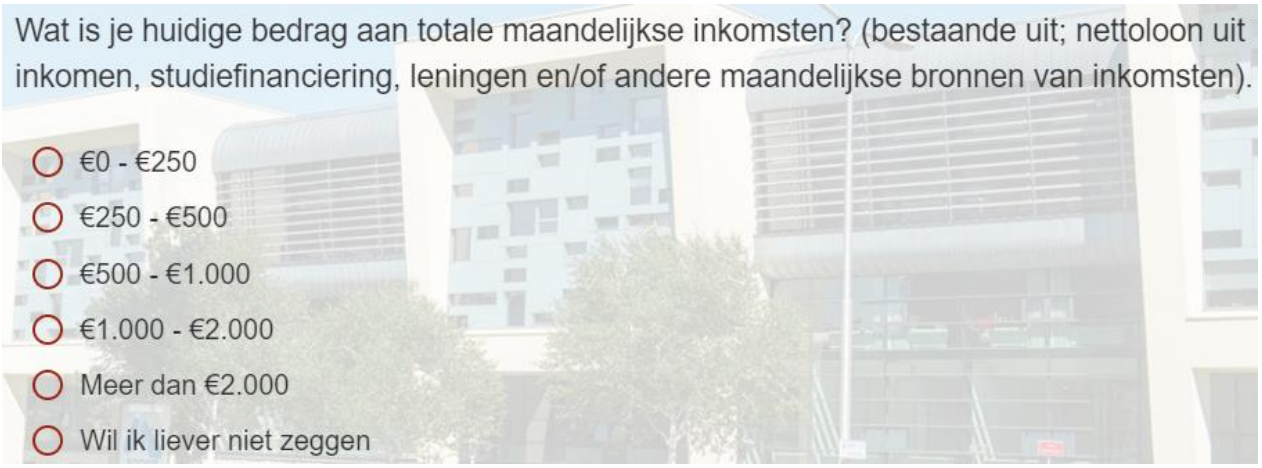
Vraag 4b



Question 4b

What is the level of education you last completed?	
Pre-vocational secondary education (Basis)	
Pre-vocational secondary education (Kader/Mixed/Theoretical)	
Senior general secondary education (Havo)	
Pre-university education (Vwo)	
Vocational education college (MBO)	
Associate Degree (AD)	
University of applied sciences (HBO-bachelor)	
University of applied sciences (HBO-master)	
University (WO-bachelor)	
University (WO-master)	

Vraag 5



Question 5

What is currently your total monthly income? (includes: net income, student loans, loans or other sources of income)	
€0 - €250	
€250 - €500	
€500 - €1.000	
€1.000 - €2.000	
> €2.000	

Vraag 6

Question 6

What is currently your wealth of savings? (consisting of your savings/ bank balance in your savings account).	
€0 - €1.000	
€1.000 - €2.500	
€2.500 - €5.000	
€5.000 - €10.000	
€10.000 - €20.000	
> €25.000	

9.1.2 **Treatment (educative nudge)**

Content of the educative nudge for treatment group

Sophie de Jong (27) en Ramon Kaya (27) zijn al vanaf kleins af aan goede vrienden. Sophie heeft onlangs de sleutels van haar eerste huis mogen ontvangen (WOZ-waarde van €320.000,-). Na het afronden van het vmbo heeft zij via het mbo een hbo-opleiding weten af te ronden toen zij 23 jaar was. Doordat Sophie vanaf haar 18e iedere maand €300,- van het inkomen door haar bijbaan gespaard heeft, kon zij gemakkelijker een hypotheek aanvragen toen zij een huis wilde kopen. Daarentegen kan haar vriend Ramon momenteel **geen** hypotheek krijgen. Ramon heeft zijn inkomen uit eerdere bijbaantjes met name uitgegeven aan vrijetijdsgoederen-en-activiteiten zoals; luxe diners, VIP-concertkaarten en TVs, telefoons en andere elektronica.

○ Ik heb de informatie aandachtig en volledig gelezen.

Beantwoord nu a.u.b. de volgende vraag.

The following information should be read attentively and completely.

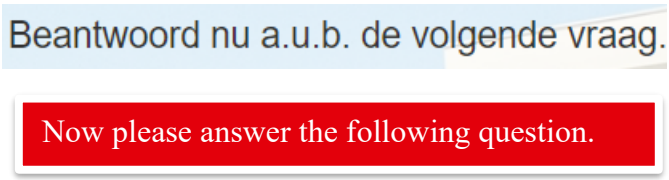
☐ I have understood this.

Sophie de Jong (27) and Ramon Kaya (27) have been good friends since childhood. Sophie recently received the keys to her first house (property value of € 320.000). After finishing secondary vocational education, she managed to complete a university of applied sciences bachelor at the age of 23. Because Sophie saved €300 of income every month through her side job from the age of 18, it was easier for her to apply for a mortgage when she wanted to buy a house. In contrast, her friend Ramon is currently unable to get a mortgage. Ramon mainly spent his income from previous side jobs on leisure goods-and-activities such as; luxury dinners, VIP concert tickets and TVs, phones and other electronics.

☐ I have read the information carefully and completely.

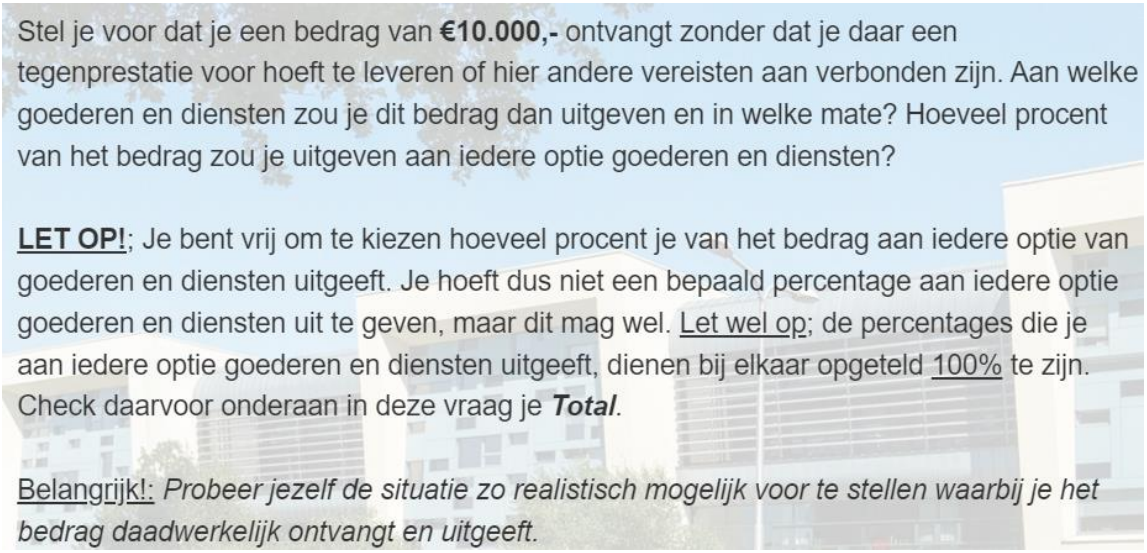
Now please answer the following question.

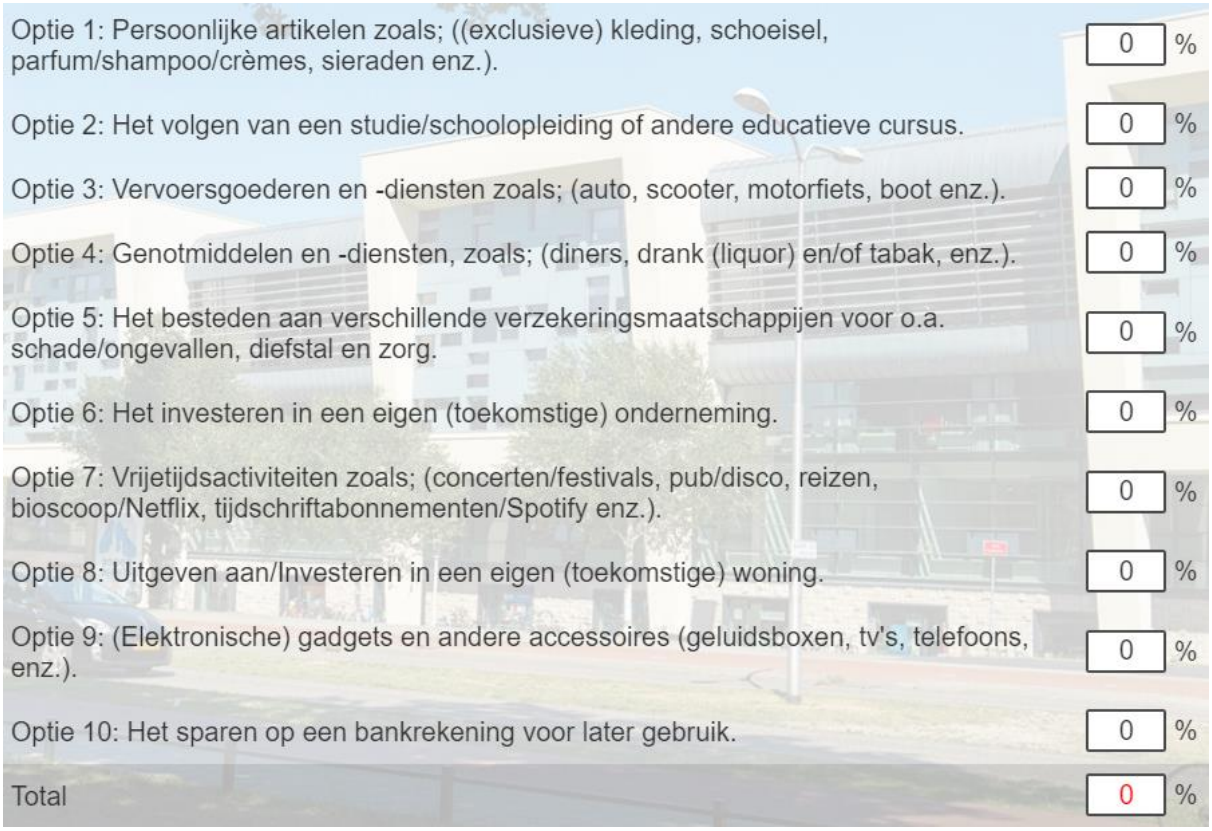
Text shown to the control group



9.1.3 **Fill-in questions related to the dependent variables**

Fill-in question dependent variable sustainable consumption behaviour





Optie 1: Persoonlijke artikelen zoals; ((exclusieve) kleding, schoeisel, parfum/shampoo/crèmes, sieraden enz.).	0 %
Optie 2: Het volgen van een studie/schoolopleiding of andere educatieve cursus.	0 %
Optie 3: Vervoersgoederen en -diensten zoals; (auto, scooter, motorfiets, boot enz.).	0 %
Optie 4: Genotmiddelen en -diensten, zoals; (diners, drank (liquor) en/of tabak, enz.).	0 %
Optie 5: Het besteden aan verschillende verzekeringsmaatschappijen voor o.a. schade/ongevallen, diefstal en zorg.	0 %
Optie 6: Het investeren in een eigen (toekomstige) onderneming.	0 %
Optie 7: Vrijetijdsactiviteiten zoals; (concerten/festivals, pub/disco, reizen, bioscoop/Netflix, tijdschriftabonnementen/Spotify enz.).	0 %
Optie 8: Uitgeven aan/Investeren in een eigen (toekomstige) woning.	0 %
Optie 9: (Elektronische) gadgets en andere accessoires (geluidsboxen, tv's, telefoons, enz.).	0 %
Optie 10: Het sparen op een bankrekening voor later gebruik.	0 %
Total	0 %

Imagine that you receive a sum of **€10.000,-** without any consideration or other requirements in return. What goods and services would you spend this amount on and to what extent? What percentage of the amount would you spend on each option of goods and services?

PLEASE NOTE!; You are free to choose what percentage of the amount of money (€10.000,-) you would spend on each option of goods and services. So you don't have to spend a certain percentage on each option of goods and services, but you are allowed to. Note that the percentages you spend on each option of goods and services should add up to 100%. For that, check your ***Total*** at the bottom of this question.

Important!; Try to imagine yourself the situation as realistically as possible where you actually receive and spend the amount.

Option 1: Personal items such as; ((exclusive) clothing, footwear, perfume/shampoo/creams, jewellery, etc.)	**X %**
Option 2: Participating in a study/school or other educational course.	**X %**
Option 3: Transport goods and services such as; (car, scooter, motorbike, boat etc.).	**X %**
Option 4: Pleasure goods-and-services, such as; (dinners, drinks(liquor) and/or tobacco, etc.).	**X %**
Option 5: Spending on various insurance companies for damages/accidents, theft and care among others.	**X %**

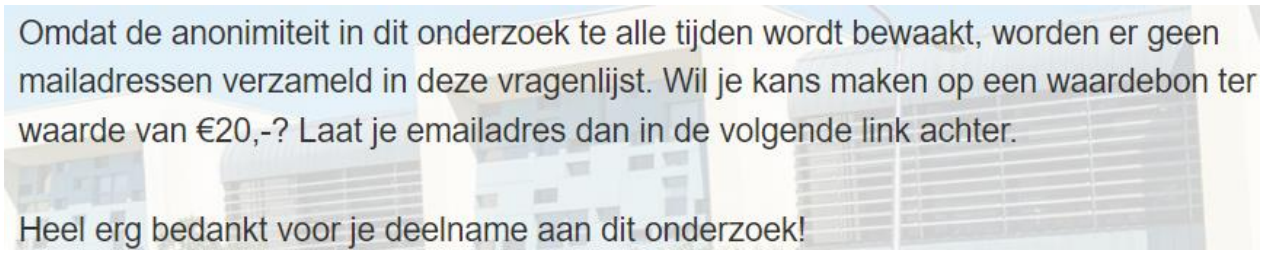
Option 6: Investing in your own (future) business.	**X %**
Option 7: Leisure activities such as; (concerts/festivals, pub/disco, travel, cinema/Netflix, magazine subscriptions/Spotify etc.).	**X %**
Option 8: Spending on/investing in a (future) own home.	**X %**
Option 9: (Electronic) gadgets and other accessories (sound boxes, TVs, phones, etc.).	**X %**
Option 10: Saving in a bank account for later use.	**X %**
TOTAL	**X %**

NOTE: THE CONSUMPTION OPTIONS SHOWN IN RED ARE THE UNSUSTAINABLE CONSUMPTION OPTIONS. THESE ARE OPTIONS: 1, 3, 4, 7 AND 9. THE CONSUMPTION OPTIONS SHOWN IN GREEN ARE THE SUSTAINABLE CONSUMPTION OPTIONS. THESE ARE OPTIONS: 2, 5, 6, 8 AND 10.

Fill-in question dependent variable the degree of self-control

Imagine that you receive a sum of **€10.000,-** without any consideration or other requirements in return. You can spend the whole amount right now, but you don't have to.	
What percentage of this amount would you expect to spend in the **first six months** after receiving it? ***Important!; Try to imagine the situation as realistically as possible where you actually receive the amount and are allowed to spend it.***	X %

Message regarding the chance to win a voucher



Because the anonymity in this survey is maintained at all times, no mail addresses are collected in this survey. Do you want a chance to win a voucher worth €20? Then leave your email address in the following link.

Thank you very much for participating in this survey!

Dear participant,
Leave your mail address below for a chance to win one of three vouchers worth €20.

Your mail address:

9.2 Reasoning & calculations sample size estimations

9.2.1 Sample size determination

An important part prior to conducting an experiment is determining the effect size and the resulting sample size estimation. In this way an estimation is made of how many observations (N) are needed per control and treatment group to measure a (possible significant) effect. The smaller the effect size measured, the larger the number of observations should be to measure an effect size. To determine effect size, the study; *The effect of financial education on students' consumer choices: Evidence from a randomised experiment* by De Beckker et al. (2021) is used. In this study De Beckker et al. (2021) uses an experimental method (RCT) to examine whether financial education

can affect students' consumer choices. The influence of financial education is measured by using choice experiments, which makes the study somewhat different from this present study related to the measurement of the independent variables. However, the effect size of financial literacy on decision-making related to sustainable financial behaviour is not shown because it did not give significant results. For this reason, De Becker et al. (2021) referred to effect sizes from other previous conducted studies. A study that De Becker et al. (2021) themselves refer to regarding the effect size of financial literacy on financial knowledge but also on financial/consumption behaviour is the paper; *Does financial education impact financial literacy and financial behaviour, and if so, when?* (Kaiser & Menkhoff, 2017). In this study, distinction is made between measuring an effect related to financial knowledge and financial behaviour (e.g. saving, investing and insuring). Kaiser & Menkhoff (2017) found an effect size of 0.26 for financial knowledge and 0.09 for financial behaviour. Because this study assumes to measure a change in financial/consumption behaviour and examines the effect on consumption choices, looking at the effect size on financial and consumption behaviour to determine a sample size is most corresponding. An effect size of 0.09 gives the following sample size;

```
           h = 0.09
           n = 1937.99
   sig.level = 0.05
       power = 0.8
 alternative = two.sided
```

FIGURE 3: POWER CALCULATION WITH EFFECT SIZE OF (0.09) (KAISER & MENKHOFF, 2017).

This means for each group – control and treatment group – a sample size of (N=1.938) is needed to observe an effect of 0.09. Another (meta-analysis) study from Kaiser, Lusardi, Mekhoff & Urban (2020) in which various experiments on the influence of financial education on, among other things, financial/consumption behaviour were examined, finds effect sizes of 0.06 up to 0.1. These effect sizes should give approximately the same sample size estimations as that of 0.09.

Another approach for determining the effect size, are the rules of thumb of the Cohen's D estimation test. Assuming a small effect size (0.2), the Cohen's D estimation test gives the following sample size;

```
          h = 0.2
          n = 392.443
  sig.level = 0.05
      power = 0.8
alternative = two.sided
```

FIGURE 4: POWER CALCULATION WITH RULE OF THUMB REGARDING COHEN'S D SMALL EFFECT SIZE (0.2)

This indicates that for each group a sample size of (N=392) is needed to detect a small effect of 0.2. These sample size estimations shows that the effect size for this study will be fairly small which indicates that a large number of observations (N) are needed to observe a difference in effect between the control and treatment group. Assuming the Cohen's D estimation test, a rounded 400 observations are needed to detect a small effect size of 0.2 with a power of 80% and a 95% confidence interval. However, it is known from other studies that the effect size of financial literacy on financial/consumption behaviour is even smaller than a small effect size (0.2) related the rule of thumb of the Cohen's D estimation test. Based on the effect size from other studies, a rounded 1.900 observations are needed to measure an effect size between 0.09 and 0.1 with a power of 80% and a 95% confidence interval.

At last, it is important to know that the effect of financial education on financial behaviours depends on the design of the study. Correlational studies often give higher effects than causal studies (De Beckker et al., 2021).

9.3 Reasoning for the measurement of the dependent variables

9.3.1 **Original question related to the fill-in question for sustainable consumption behaviour**

Q19. Imagine you have 100 Euro available in the next month but no other income. How do you allocate the money to the following? Please allocate the money so that you spend exactly 100 Euro.

Savings	_____ Euro
Food and drinks	_____ Euro
Transport (for example bus or train)	_____ Euro
Leisure (going out, cinema, concerts)	_____ Euro
Clothes, shoes and/or cosmetics	_____ Euro
Magazines and books	_____ Euro
Computer games and internet	_____ Euro
Mobile phones	_____ Euro
Sweets	_____ Euro
Ringtones/music downloads	_____ Euro
Other	_____ Euro

FIGURE 5: QUESTION 19 FROM THE SUPPLEMENTARY MATERIAL OF THE SURVEY; TEACHING TEENAGERS IN FINANCE: DOES IT WORK? (LÜHRMANN, ET AL., 2015)

9.3.2 Original question related to the fill-in question for self-control

We asked the following question:

Suppose you win ten certificates, each of which can be used (once) to receive a "dream restaurant night." On each such night, you and a companion will get the best table and an unlimited budget for food and drink at a restaurant of your choosing. There will be no cost to you: all payments, including gratuities, come as part of the prize. The certificates are available for immediate use, starting tonight, and there is an absolute guarantee that they will be honored by any restaurant you select if they are used within a two-year window. If they are not used up within this two-year period, however, any that remain are valueless.

The questions below concern how many of the certificates you would ideally like to use in each year, how tempted you would be to depart from this ideal, and what you expect you would do in practice:

(a) From your current perspective, how many of the ten certificates would you ideally like to use in year 1 as opposed to year 2?

FIGURE 6: QUESTION TO CONTROL FOR SELF-CONTROL BIAS (AMERIKS ET AL., 2007)

9.3.3 Visual representation of research methodology

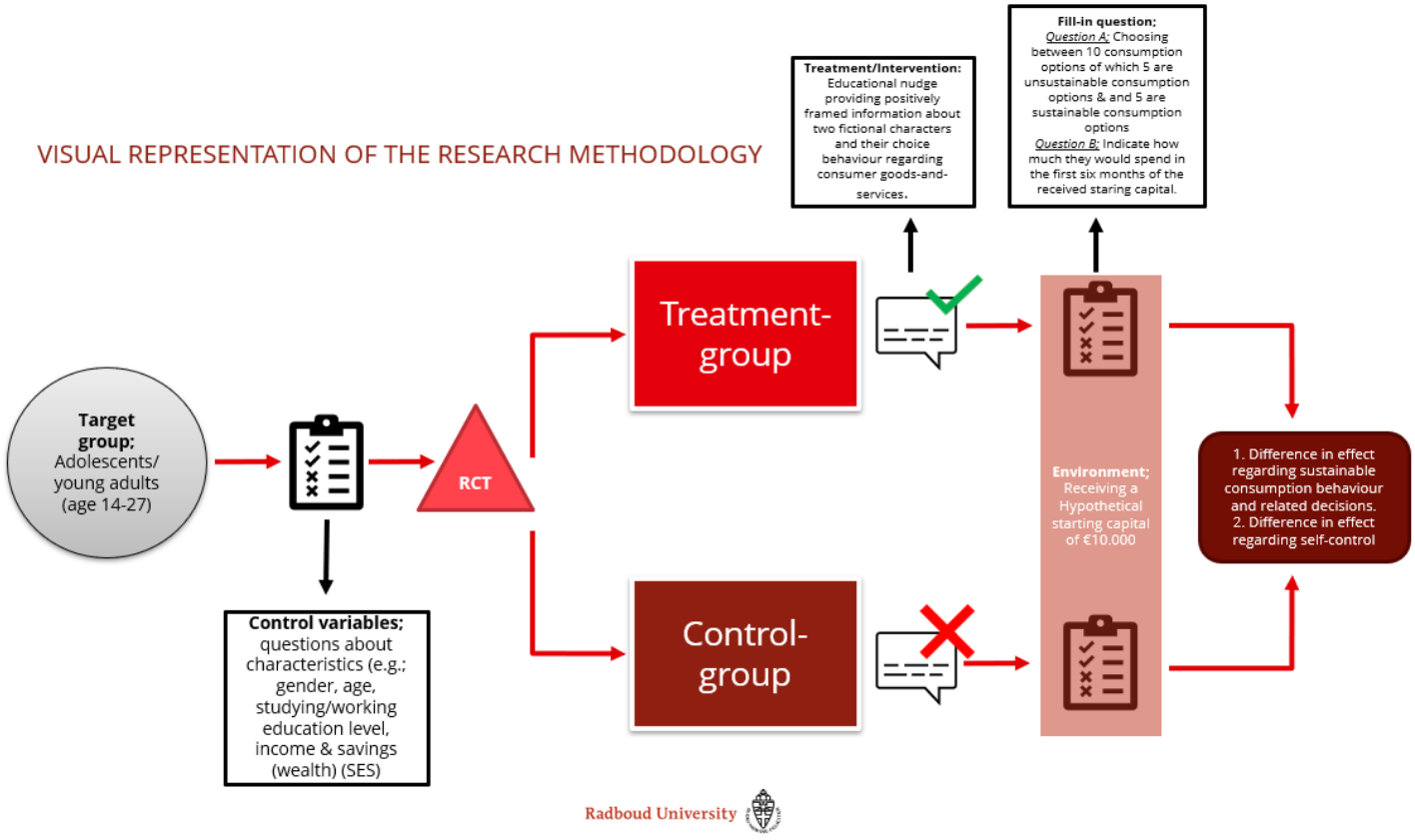


FIGURE 7: VISUAL REPRESENTATION OF THE RESEARCH FLOW & METHODOLOGY

9.4 Appendix regarding the results

9.4.1 Additional survey regarding the interrater reliability

Dear participant,

Thank you for agreeing to complete this survey and taking time to do so. Completing the entire survey will take about 3 minutes. The aim of this survey is to analyze the reliability of the methodology of a survey on consumption behavior.

Please read the information and questions carefully before answering. It is also important that you answer all questions honestly. This research is conducted under the responsibility of Radboud University Nijmegen. This means that your anonymity will be guaranteed at all times and that given answers will not be given to third parties under any circumstances.

Thank you very much in advance for filling in the survey!

Geef van onderstaande stellingen/opties aan in hoeverre/in welke mate je vindt dat de stelling/optie behoort tot een duurzaam consumptiegoed-en/of-dienst. (Met een duurzaam consumptiegoed-en/of-dienst wordt bedoeld dat een individu voor een langere periode - nu, maar ook zeker in de toekomst - van de voordelen geniet door het gebruik van een bepaalde consumptiegoed-en/of-dienst).


Mee oneens
Enigzins mee oneens
Niet mee eens / niet mee oneens
Enigszins mee eens
Mee eens
Optie 1: Persoonlijke artikelen zoals; ((exclusieve) kleding, schoeisel, parfum/shampoo/crèmes, sieraden enz.).
Optie 2: Het volgen van een studie/schoolopleiding of andere educatieve cursus.
Optie 3: Vervoersgoederen en -diensten zoals; (auto, scooter, motorfiets, boot enz.).
Optie 4: Genotmiddelen en -diensten, zoals; (diners, drank (liquor) en/of tabak, enz.).
Optie 5: Het besteden aan verschillende verzekeringsmaatschappijen voor o.a. schade/ongevallen, diefstal en zorg.
Optie 6: Het investeren in een eigen (toekomstige) onderneming.
Optie 7: Vrijetijdsactiviteiten zoals; (concerten/festivals, pub/disco, reizen, bioscoop/Netflix, tijdschriftabonnementen/Spotify enz.).
Optie 8: Uitgeven aan/Investeren in een eigen (toekomstige) woning.
Optie 9: (Elektronische) gadgets en andere accessoires (geluidsboxen, tv's, telefoons, enz.).
Optie 10: Het sparen op een bankrekening voor later gebruik.

Of the statements/options below, please indicate to what extent you think the statement/option belongs to a sustainable consumption good and/or service. (A sustainable consumption good and/or service means that an individual enjoys the benefits for an extended period of time – now, but also certainly in the future – by using a particular consumption good and/or service).					
	Disagree	**Slightly disagree**	**Not agree/not disagree**	**Slightly agree**	**Agree**
Personal items such as; ((exclusive) clothing, footwear, perfume/shampoo/creams, jewellery, etc.).					
Participating in a study/school or other educational course.					
Transport goods and services such as; (car, scooter, motorbike, boat etc.).					
Pleasure goods-and-services, such as; (dinners, drinks(liquor) and/or tobacco, etc.).					
Spending on various insurance companies for damages/accidents, theft and care among others.					
Investing in your own (future) business.					
Leisure activities such as; (concerts/festivals, pub/disco, travel, cinema/Netflix, magazine subscriptions/Spotify etc.).					
Spending on/investing in a (future) own home.					
(Electronic) gadgets and other accessories (sound boxes, TVs, phones, etc.).					
Saving in a bank account for later use.					

9.4.2 **Tables related to heteroskedasticity**

TABLE 7: BREUSCH-PAGAN TEST FOR EACH MODEL

Results Breusch-Pagan test for each model		
	Chi-square (df)	**Sig. (α=0.05)**
Sustainable Behaviour1	1.511	0.219
Self-control1	2.560	0.110
Sustainable Behaviour2	14.088	0.050
Self-control2	12.869	0.075
Education1	0.063	0.802
Education2	12.966	0.072
Insurances1	0.000	1.000
Insurances2	17.387	0.015
Business1	4.755	0.029
Business2	27.153	<0.001
Home1	0.298	0.585
Home2	28.245	<0.001
Savings1	0.174	0.677
Savings2	20.054	0.005

NOTE: THIS OVERVIEW SHOWS ALL BREUSCH-PAGAN P-VALUES FOR EACH MODEL. THE MODEL NAMES CORRESPOND TO THE MODEL NAMES IN THE SIMPLIFIED AND MULTIVARIATE REGRESSION MODELS IN THE RESULTS SECTION. ALL P-VALUES UNDERLINED ARE SIGNIFICANT FOR A P-VALUE AT 0.05 LEVEL, INDICATING THE PRESENCE OF HETEROSKEDASTICITY.

9.4.3 **Tables related to multicollinearity**

To check for multicollinearity in the data of this study, there are several ways to apply. Multicollinearity refers to an almost direct relationship between two different variables (Alin, 2010). A first way to measure multicollinearity is by using the Pearson correlation test. The Pearson correlation test looks at a coefficient value (r) to indicate how high the correlation is between two variables. A correlation coefficient higher than 0.8 is referred to – by several researchers – as a coefficient involving high correlation between two variables (Studenmund, 2017, p.251). Table 8 shows the correlation matrix of this study in which no correlation coefficients with a value higher than 0.8 are observable.

TABLE 8: CORRELATION MATRIX ALL CONTROL VARIABLES

	T	G	A	S/W	E	I	W	SCB	S-C	E	I	B	H	S
T	1.000	-0.024	-0.052	0.007	0.196	0.134	0.117	0.082	0.074	0.059	0.007	-0.068	-0.055	0.110
G	-0.024	1.000	0.149	0.064	0.252	-0.036	-0.076	0.024	0.092	0.024	0.024	-0.178	0.096	0.016
A	-0.052	0.149	1.000	0.423	0.688	0.680	0.289	0.211	0.012	-0.046	-0.198	-0.111	0.248	0.117
S/W	0.007	0.064	0.423	1.000	0.166	0.479	0.226	0.157	-0.050	-0.133	-0.077	0.045	0.196	0.061
E	-0.063	0.252	0.688	0.166	1.000	0.423	0.214	0.196	0.082	0.077	-0.164	-0.222	0.182	0.131
I	-0.018	-0.036	0.680	0.479	0.423	1.000	0.378	0.134	-0.078	-0.129	-0.186	-0.058	0.263	0.057
W	0.018	-0.076	0.289	0.266	0.214	0.378	1.000	0.177	0.034	-0.155	-0.170	-0.113	0.166	0.200
SCB	0.082	0.024	0.211	0.157	0.196	0.134	0.177	1.000	0.263	0.179	-0.069	0.142	0.299	0.523
S-C	0.074	0.092	0.012	-0.050	0.082	-0.078	0.034	0.263	1.000	0.013	-0.086	-0.094	-0.043	0.314
E	0.059	0.024	-0.046	-0.133	0.077	-0.129	-0.155	0.179	0.013	1.000	0.166	-0.045	-0.164	-0.260
I	0.007	0.024	-0.198	-0.077	-0.164	-0.186	-0.170	-0.069	-0.086	0.166	1.000	0.034	-0.090	-0.274
B	-0.068	-0.178	-0.111	0.045	-0.222	-0.058	-0.113	0.142	-0.094	-0.045	0.034	1.000	-0.065	-0.263
H	-0.055	0.096	0.248	0.196	0.182	0.263	0.166	0.299	-0.043	-0.164	-0.090	-0.065	1.000	-0.324
S	0.110	0.016	0.117	0.061	0.131	0.057	0.200	0.523	0.314	-0.260	-0.274	-0.263	-0.324	1.000

NOTE: LEGEND: T=TREATMENT, G=GENDER, A=AGE, S/W=STUDYING/WORKING, E=EDUCATION LEVEL, I=INCOME. W=WEALTH, SCB=SUSTAINABLE CONSUMPTION BEHAVIOUR, S-C=SELF-CONTROL, E=EDUCATION, I=INSURANCES, B=BUSINESS, H=HOME/HOUSE, S=SAVINGS.

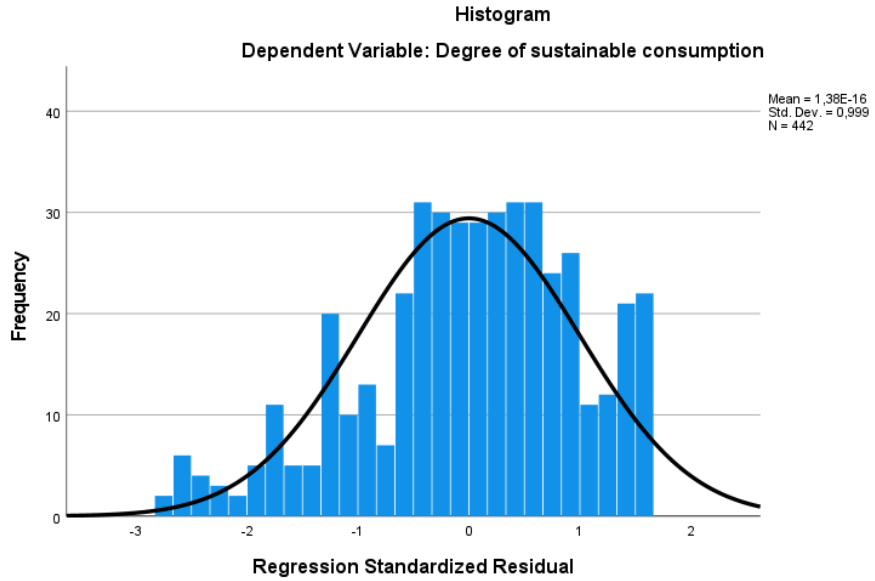
A second – more common – way to apply is the Variance Inflation Factor analysis (VIF-analysis). The VIF is a method in which the presence of multicollinearity is measured by considering whether an independent variable can be explained by other variables in the model. Therefore a VIF is conducted for each independent variable (Studenmund, 2017, p.252). The rule of thumb for the VIF is that there is no high correlation between a variable and all other variables in the model if the VIF-value is higher than the tolerance level but does not exceed the value of 5 (Micheal & Abiodun, 2014; Studenmund, 2017, p.252). Table 9 shows the VIF-values for the independent variables of this study. None of the VIF-values exceeds the collinearity tolerance or the rule-of-thumb value of 5.

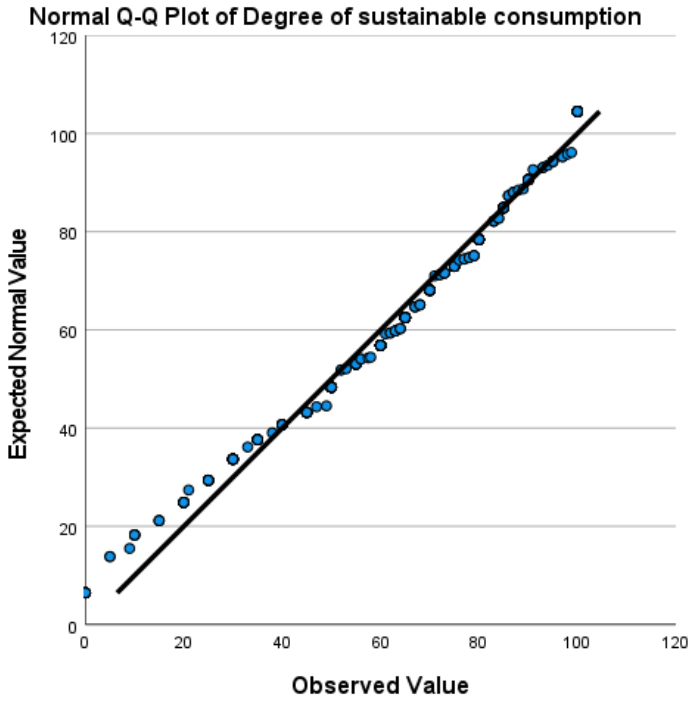
TABLE 9: VARIANCE INFLATION FACTOR (VIF-VALUES)

Variance Inflation Factor (VIF-values) of all control & independent variables		
VIF-values including all control & independent variables of all models		
	VIF-value	**Collinearity tolerance**
Treatment	1.006	0.994
Age	1.125	0.889
Gender	3.092	0.323
Studying/Working	1.402	0.713
Education	2.080	0.481
Income	2.205	0.454
Wealth	1.200	0.834

9.4.4 Graphs and tables regarding normal distribution

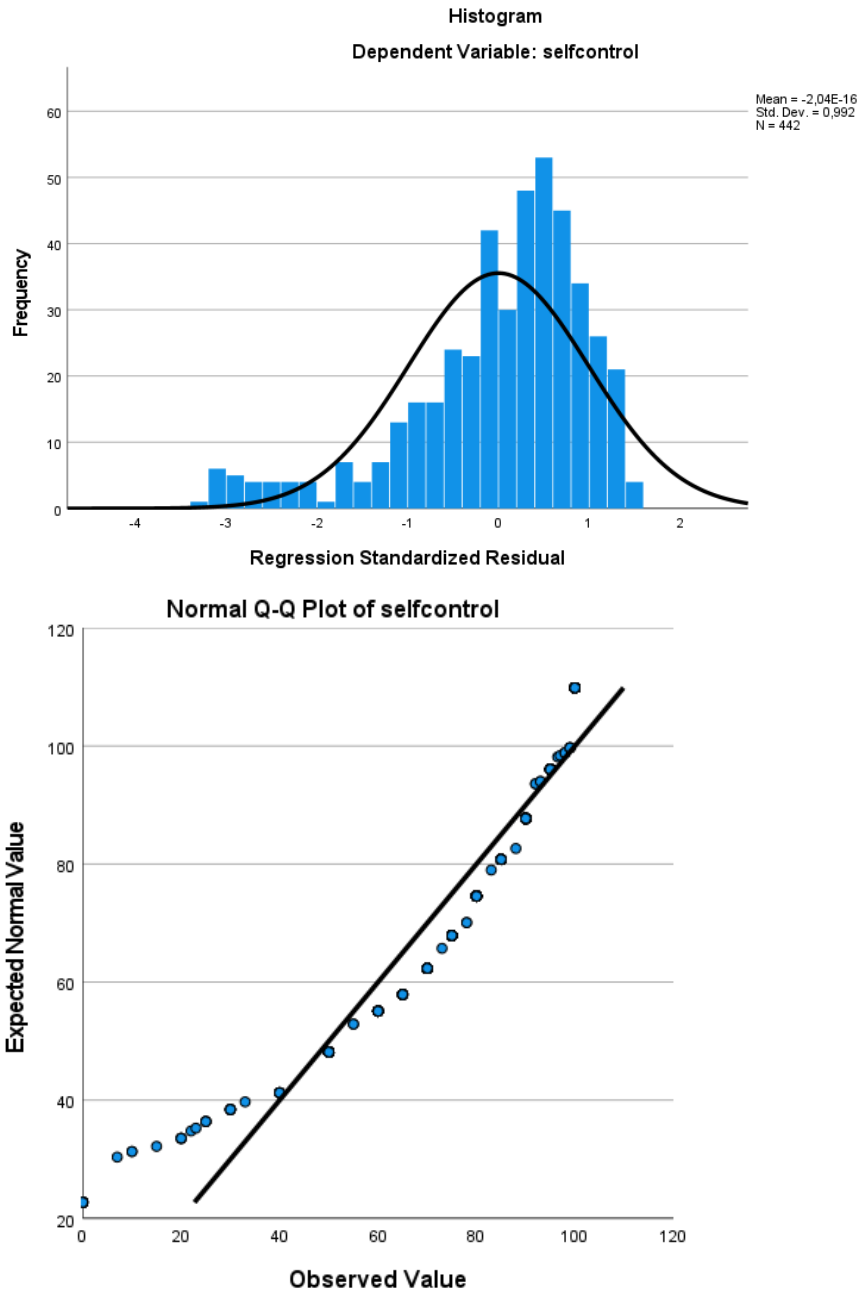
GRAPH 1: NORMALITY HISTOGRAM AND Q-Q PLOT DEPENDENT VARIABLE SUSTAINABLE CONSUMPTION BEHAVIOUR





The distribution of the data of the dependent variable *sustainable consumption behaviour* appears to be reasonably normal according to the histogram. The Q-Q plot shows the dots do follow the straight line overall except at the beginning (bottom left) of the straight line.

GRAPH 2: NORMALITY HISTOGRAM AND Q-Q PLOT ADDITIONAL DEPENDENT VARIABLE SELF-CONTROL



The distribution of the data of the dependent variable *self-control* is less normal than the data of the dependent variable sustainable consumption behaviour. In addition, the Q-Q plot shows that the points do not correspond to the straight line. The points together form slightly a convex line.

TABLE 10: NON-PARAMETRIC – MANN WHITNEY U - TEST

	Mann Whitney U test (Pre-treatment variables)		
	Treatment (N=213)	Control (N=229)	Asymptotic Sig. (p-value)
	Mean Rank	*Mean Rank*	
Gender	218.82	223.99	0.621
Age	215.42	227.16	0.310
Studying/Working	222.01	221.02	0.887
Education	214.63	227.89	0.202
Income	218.65	224.15	0.642
Wealth	224.15	219.03	0.668

From Table 10, it can be noticed that none of the p-values are below the critical p-value of 0.05. This means that there are no significant differences between the control and treatment group with regard to the distribution of the control variables across the control and treatment group.

9.4.5 **All results related to the underlying sustainable consumption options**

Table 11 shows all the results of the five underlying consumption options of the (overarching) concept of sustainable consumption behaviour. The sustainable consumption options are in this table represented by the following models; following an education (models *Education1 & Education2*), spendings on insurances (models *Insurances1 & Insurances2*), investments in an own business (models *Business1 & Business2*), investments in an own home/house (models *Home1 & Home2*) and savings (models *Savings1 & Savings2*). The models *Education1*, *Insurances1*, *Business1*, *Home1* and *Savings1* are the simplified OLS-regression models and examine the effect of the treatment on one of the underlying sustainable consumption options. The models *Education2*, *Insurances2*, *Business2*, *Home2* and *Savings2* are respectively comparable to the first models but include the six control variables. The section *5.4.2 Results for the underlying consumption options* shows only the models from which the most important results for this study emerged. This means that in those models – *Business1*, *Savings1*, *Business2* and *Savings2* – a significant effect of the treatment on the underlying consumption option is observed (Table 6b). Table 11 shows the results of the effect of the treatment on all the underlying sustainable consumption options and includes therefore all models.

TABLE 11: LINEAR REGRESSION MODELS OF ALL UNDERLYING CONSUMPTION OPTIONS

Results underlying sustainable consumption options (Education, Insurances, Business, Home and Savings).										
	Exclusive control variables									
Model	**Education1**		**Insurances1**		**Business1**		**Home1**		**Savings1**	
	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value
(Constant)	8.509*** (0.920)	<0.001	2.978*** (0.311)	<0.001	6.336*** (0.933)	<0.001	13.498*** (1.316)	<0.001	30.122*** (1.788)	<0.001
Treatment	1.656 (1.349)	0.220	0.062 (0.442)	0.891	-1.646 (1.141)	0.150	-2.113 (1.834)	0.250	5.903* (2.539)	0.021
Number of observations	442		442		442		442		442	
R-squared	0.003		0.000		0.005		0.003		0.012	
	Inclusive control variables									
Model	**Education2**		**Insurances2**		**Business2**		**Home2**		**Savings2**	
	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value
(Constant)	8.490** (2.893)	0.004	6.348*** (1.262)	<0.001	20.139*** (4.130)	<0.001	-11.337* (5.162)	0.029	8.211 (7.885)	0.298
Treatment (ref=control)	1.965 (1.334)	0.141	-0.009 (0.442)	0.984	-1.965+ (1.113)	0.078	-1.820 (1.792)	0.310	6.117* (2.512)	0.015
Gender (ref=male)	-0.831 (1.512)	0.583	0.391 (0.468)	0.403	-3.681** (1.201)	0.002	3.351+ (1.919)	0.081	-0.314 (2.635)	0.905
Age	-0.545 (1.209)	0.653	-0.513 (0.388)	0.388	0.704 (1.325)	0.595	1.317 (1.666)	0.430	2.166 (2.320)	0.351
Studying/ Working (ref=Stud.)	-2.672 (2.060)	0.195	0.482 (0.882)	0.882	3.981 (2.681)	0.138	3.922 (3.886)	0.313	1.230 (4.957)	0.804
Education	4.935** (1.676)	0.003	-0.489 (0.530)	0.356	-4.489** (1.603)	0.005	0.730 (1.868)	0.696	4.294 (3.297)	0.193
Income	-1.183 (0.727)	0.104	-0.237 (0.242)	0.330	-0.205 (0.776)	0.792	2.277* (1.088)	0.037	-2.321+ (1.322)	0.080
Wealth	-1.121** (0.395)	0.005	-0.306* (0.145)	0.036	-0.821* (0.392)	0.036	0.858 (0.611)	0.161	3.103*** (0.809)	<0.001
Number of observations	442		442		442		442		442	
Adj. R-squared	0.048		0.044		0.077		0.082		0.052	

NOTE: THE MODELS (EDCUATION1, INSURANCES1, BUSINESS1, HOME1 AND SAVINGS1) CONSIST OF THE SIMPLIFIED REGRESSION MODELS AND MEASURED THE EFFECT OF THE TREATMENT ON THE AMOUNT THE ADOLESCENTS SPENT ON EACH UNDERLYING SUSTAINABLE CONSUMPTION OPTION, WHICH ARE RESPECTIVELY: FOLLOWING AN EDUCATION, SPENDINGS ON INSURANCES, INVESTMENTS IN AN OWN BUSINESS, INVESTMENTS IN AN OWN HOME/HOUSE AND SAVINGS. THE MODELS (EDCUATION2, INSURANCES2, BUSINESS2, HOME2 AND SAVINGS2) ARE THE MULTIVARIATE REGRESSION MODELS WHICH MEASURED THE EFFECT OF THE TREATMENT - INCLUDING THE CONTROL VARIABLES – ON THE AMOUNT ADOLESCENTS SPENT ON EACH UNDERLYING SUSTAINABLE CONSUMPTION OPTION WHICH ARE RESPECTIVELY: FOLLOWING AN EDUCATION, SPENDING ON INSURANCES, INVESTMENTS IN AN OWN BUSINESS, INVESTMENTS IN AN OWN HOME/HOUSE AND SAVINGS.
ROBUST STANDARD ERRORS IN PARENTHESES → HC03 METHOD; *** P < 0.001, ** P < 0.01, * P < 0.05, + P < 0.10

The models *Education1*, *Insurances1*, *Business1*, *Home1* and *Savings1* are the simplified regression models in which the independent variable is the treatment and the dependent variable the corresponding underlying sustainable consumption option. The treatment has no significant effect on the amount adolescents spent on the underlying consumption options: following an education (*Education1*), spending on insurances (*Insurances1*), investments in an own business (*Business1*) and investments in an own home/house (*Home1*). The regression weights of the treatment and corresponding p-values of these models are: 1.656 (p=0.220), 0.062 (p=0.891), -1.646 (p=0.150) and -2.113 (p=0.250) respectively. However, the treatment in model *Savings1* has a significant positive effect with a (B) of 5.903 at the 0.05 level. This indicates that the treatment has a significant positive effect on the amount adolescents spent on the sustainable consumption option related to savings.

Model *Education2* is comparable to model *Education1* but now the six control variables are included next to the independent variable which is the treatment. Similar to model *Education1* the treatment has no significant effect with a regression weight of 1.965 (p=0.141). This means the treatment has no effect on the amount adolescents spent on following education. The control variables *education level* and *wealth* are both significant at a 0.01, but education level is significant positive with a regression weight of 4.935 and wealth is significant negative with a regression weight of -1.121. This means adolescents with a higher education level spent more on the sustainable consumption option related to following education, but adolescents with more wealth spent less on following education. Model *Insurances2* is the multivariate model which includes all control variables and the independent variable which is the treatment. The treatment has no significant effect with a (B) of -0.009 (p=0.984) on the amount adolescents spent on the consumption option related to insurances. *Wealth* has a significant negative effect with a (B) of -0.306 at the 0.05 level on the consumption option related to spending on insurances. The more

wealth, the more adolescents spent on insurances. *Business2* is comparable to *Business1* but includes all the control variables as well as the independent variable which is the treatment. The treatment has a significant negative effect with a regression weight of -1.965 at the 0.10 level. The effect the treatment in *Business2* is significant compared to model *Business1*. In addition, the regression weight of the treatment is somewhat more negative. This indicates the treatment has a significant negative effect on the amount adolescents spent on investments in an own business when including all control variables. The control variables *gender* and *education level* are both significant negative at the 0.01 level with regression weights of -3.681 and 4.489 respectively. *Wealth* has a significant negative effect with a (B) of -0.821 at the 0.05 level. Being female, a higher education level and a larger amount of wealth are all negatively associated with the consumption option related to investments in an own business. Model *Home2* is the multivariate regression model which includes the six control variables. The effect of the treatment contains a regression weight of -1.820 (p=0.310), but has no significant effect on the amount adolescents spent on investments in an own house. The control variable *gender* shows a significant positive effect on investments in an own house with a regression weight of 3.351 at the 0.10 level. *Income* is also significant positive on investments in an own house with a regression weight of 2.277 at the 0.05 level. Being female and more income are positively associated with the amount adolescents spent on investments in an own house. Model *Savings2* is comparable to model *Savings1,* but now all control variables are included. The treatment has a significant positive effect at the 0.05 level. In comparison to model *Savings1*, is the effect of the treatment somewhat increased but the result is the same which means that adolescents who received the treatment spent significantly more on the consumption option related to savings. In addition, the control variable *income* is significant at the 0.10 level with a regression weight of -2.321. *Wealth* has a positive significant effect with a (B) of 3.103 ($p<0.001$) at the <0.001 level. This indicates that adolescents with a higher income spent less on the sustainable consumption option related to savings, but the adolescents with more wealth spent more on savings.

9.4.6 **Robustness checks related to models in the main results section**

Table 12a consists of the results for the robustness checks of models (*Sustainable Behaviour1*, *Self-control1*, *Sustainable Behaviour2*, *Self-control2*). Table 12b consists of the robustness checks for the models that test for the underlying sustainable consumption options related to investing in an

own business and savings. A robustness check was only conducted for the models of the underlying consumption options on which the treatment has a significant effect, which are: *Business1, Savings1, Business2* and *Savings2*. To apply the robustness checks, the choice is made to recode the data of the dependent variables of the models. The continuous data of the dependent variables in all the models is recoded into categorical data by means of a dummy variable. To recode the continuous data into categorical data, new categories – consisting of the reference category (0) and the dummy category (1) – were created for each dependent variable. To obtain a corresponding cut-off point for the formation of the different categories, the average amounts which adolescents spent on each dependent variable (i.e. the average spendings: on all sustainable consumption options, on investments in own business and on savings) were calculated. Also the average amount that adolescents saved on the dependent variable (i.e. the degree of self-control) is calculated. The average amount the treatment and control group spent together on the dependent variable (overarching) *sustainable consumption options* is 63.30%. Both groups spent on average an amount of 5.54% on the underlying consumption option related to investments in an own business. The average amount both groups spent on the underlying consumption option related to savings is 32.97%. At last both groups saved on average an amount of 73.45% on the dependent variable s*elf-control*. All average amounts are visible in Table 2a in section *5.2 Descriptive statistics*. For each dependent variable, the formation of the new categories is constructed in such a way that adolescents who spent or saved below the average amount of the dependent variable are assigned to the reference class (0) and the adolescents who spent or saved above the average amount on the dependent variable are assigned to the dummy (1). This means for each dependent variable the new categories are constructed as follows: overarching sustainable consumption behaviour (< 63.30% = 0; > 63.31% = 1), underlying consumption option related to investments in an own business (< 5.54% = 0; > 5.55% = 1), underlying consumption option related to savings (< 32.97% = 0; > 32.98% = 1) and the degree of self-control (< 73.45% = 0, > 73.46% = 1).

The dependent variables which were recoded in categorical data by means of dummy variables are accommodated in new models. These new models are *Sustainable behaviourRC1, Sustainable behaviourRC1, Self-controlRC1* and *Self-controlRC2* – which are given in Table 12a – and *BusinessRC1, SavingsRC1, BusinessRC2* and *SavingsRC2,* which are presented in Table 12b.

These models are the robustness check for the models *Sustainable behaviour1*, *Self-control1*, *Sustainable behaviour2*, *Self-control2*, *Business1*, *Savings1*, *Business2* and *Savings2* respectively.

TABLE 12A: ROBUSTNESS CHECK MAIN MODELS SUSTAINABLE CONSUMPTION BEHAVIOUR & SELF-CONTROL

Results robustness checks dependent variables: sustainable consumption behaviour & the degree of self-control								
	Exclusive control variables				*Inclusive control variables*			
Model	**Sustainable behaviourRC1**		**Self-controlRC1**		**Sustainable behaviourRC2**		**Self-controlRC2**	
	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value
(Constant)	0.507*** (0.033)	<0.001	0.585*** (0.033)	<0.001	-0.150 (0.140)	0.284	0.394** (0.139)	0.005
Treatment (ref=control)	0.099* (0.047)	0.037	0.077+ (0.046)	0.097	0.108* (0.046)	0.020	0.080+ (0.046)	0.086
Gender (ref=male)					0.048 (0.049)	0.334	0.048 (0.050)	0.328
Age					-0.005 (0.046)	0.919	-0.004 (0.044)	0.929
Studying/Working (ref=studying)					0.122 (0.083)	0.143	-0.012 (0.083)	0.884
Education					0.161** (0.059)	0.007	0.078 (0.061)	0.198
Income					-0.016 (0.028)	0.573	-0.048+ (0.027)	0.073
Wealth					0.029+ (0.015)	0.057	0.024 (0.015)	0.112
Number of observations	442		442		442		442	
R^2/Adj. R^2	R-squared=0.010		R-squared=0.006		Adj. R^2= 0.054		Adj. R^2= 0.013	

NOTE: THE NAMES OF THE MODELS IN THE TABLE CORRESPOND TO THE NAMES IN THE TABLE OF THE REGRESSION MODELS IN THE RESULTS SECTION. TO INDICATE THAT THESE MODELS HAVE BEEN RECODED FOR THE ROBUSTNESS CHECK A 'RC' IS ADDED TO THE NAME OF THE MODELS. THIS MEANS THE MODELS (*SUSTAINABLE BEHAVIOURRC1*, *SELF-CONTROLRC1*, *SUSTAINABLE BEHAVIOURRC2* AND *SELF-CONTROLRC2*), CORRESPOND RESPECTIVELY TO (*SUSTAINABLE BEHAVIOUR1*, *SELF-CONTROL1*, *SUSTAINABLE BEHAVIOUR2* AND *SELF-CONTROL2*).

TABLE 12B: ROBUSTNESS CHECKS MODELS UNDERLYING SUSTAINABLE CONSUMPTION OPTIONS (BUSINESS & SAVINGS)

Results robustness checks of the underlying sustainable consumption options where the treatment has a significant effect on (Business & Savings)								
	Exclusive control variables				*Inclusive control variables*			
Model	**BusinessRC1**		**SavingsRC1**		**BusinessRC2**		**SavingsRC2**	
	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value	Coeff. (B) (R. St. Err.)	p-value
(Constant)	0.223*** (0.028)	<0.001	0.367*** (0.032)	<0.001	0.887*** (0.130)	<0.001	-0.003 (0.135)	0.984
Treatment (ref=control)	0.003 (0.040)	0.947	0.098* (0.047)	0.037	-0.015 (0.038)	0.695	0.104* (0.046)	0.026
Gender (ref=male)					-0.107** (0.041)	0.009	-0.015 (0.048)	0.754
Age					-0.020 (0.037)	0.558	0.056 (0.045)	0.216
Studying/Working (ref=studying)					0.086 (0.074)	0.242	-0.044 (0.085)	0.602
Education					-0.196*** (0.053)	<0.001	0.080 (0.059)	0.180
Income					0.010 (0.023)	0.659	-0.037 (0.026)	0.153
Wealth					-0.016 (0.012)	0.173	0.053*** (0.015)	<0.001
Number of observations	442		442		442		442	
R^2/Adj. R^2	R-squared=0.000		R-squared= 0.010		Adj. R^2= 0.107		Adj. R^2= 0.050	

NOTE:THE NAMES OF THE MODELS IN THE TABLE CORRESPOND TO THE NAMES IN THE TABLE OF THE REGRESSION MODELS IN THE RESULTS SECTION. TO INDICATE THAT THESE MODELS HAVE BEEN RECORDED FOR THE ROBUSTNESS CHECK A 'RC' IS ADDED TO THE NAME OF THE MODELS. THIS MEANS THE MODELS (*BUSINESSRC1, SAVINGSRC1, BUSINESSRC2 AND SAVINGSRC2)* CORRESPOND RESPECTIVELY TO (*BUSINESS1, SAVINGS1, BUSINESS2 AND SAVINGS2*).

Recoding the data of the dependent variables from continuous data to categorical data gave several changes regarding the effect of the treatment for each model. The changes for each model are described below.

Sustainable behaviourRC1 is the robustness check model of the model *Sustainable behaviour1*. This model is the simplified regression model in which the treatment is the independent variable and sustainable consumption behaviour the recoded dependent variable. The effect of the treatment

decreased – compared to model *Sustainable behaviour1* – and contains a (B) of 0.099. In addition, the effect of the treatment is significant at the 0.05 level (p=0.037). This means the significance level increased in comparison to model *Sustainable behaviour1* from the 0.10 to the 0.05 level, but the result stays the same which means that the treatment has a positive significant effect on the amount adolescents spent on sustainable consumption options. *Self-controlRC1* is comparable with model *Self-control1* but now the model is considered for robustness checks. The effect of the treatment is significant at a 0.10 level with a positive regression weight of 0.077 ((p=0.049 one-sided and significant at the 0.05 level). This indicates the treatment has a significant positive effect on self-control of adolescents in contrast to model *Self-control1* which found no significant result.

Model *Sustainable behaviourRC2* is the multivariate regression model for robustness check including the six control variables. The treatment shows a significant positive regression weight of 0.108 (p=0.020). Compared to model *Sustainable Behaviour2*, the effect of the treatment decreased, but the significance level increased from the 0.10 to the 0.05 level. The control variable *studying/working* shows compared to model *Sustainable Behaviour2* no significant effect, but the control variables *education level* – with a regression weight of 0.161 (p=0.007) and *wealth* – with a regression weight of 0.029 (p=0.057) are both significant at the 0.01 and 0.10 level respectively. This means the level of significance increased for educational level from the 0.10 to the 0.01 level, but decreased for wealth from the 0.05 to the 0.10 level compared to model *Sustainable Behaviour2.* The effect of both variables decreased in comparison with the effect of the similar control variables in model *Sustainable Behaviour2*, but for both control variables the result stays the same. This indicates that a higher education level and more wealth are positively associated with the amount adolescents spent on sustainable consumption options. Model *Self-controlRC2* is comparable with model *Self-control2* and is the robustness check for this model. The treatment has a significant positive effect with a (B) of 0.080 on self-control at the 0.10 level. The effect of the treatment decreased in comparison with model *Self-control2*. The control variable *income* shows a significant negative regression weight of -0.048 at the 0.10 level. Compared to model *Self-control2* the significance level decreased from 0.05 to the 0.10 level, but the result is similar. More income is negatively correlated with self-control.

Model *BusinessRC1* is the simplified regression model in which the treatment is the independent variable and the underlying consumption option related to investments in an own business, the recoded dependent variable. This model is the robustness check for model *Business1*. The treatment has a regression weight of 0.003 and is not significant. The results stays the same as in model *Business1* which means that the treatment has no significant effect on the amount adolescents spent on the sustainable consumption option related to investments in an own business. Model *SavingsRC1* is the simplified robustness check model with the treatment as independent variable and the underlying consumption option related savings as the recoded dependent variable. The treatment shows a positive significant regression weight of 0.098 at the 0.05 level. The effect of the treatment decreased from 5.903 to 0.098 but the result is similar. This indicates that the treatment has a significant positive effect on the amount adolescents spent on the sustainable consumption option related to savings.

Model *BusinessRC2* is the multivariate regression model including all control variables and the robustness check for model *Business2*. The treatment has a regression weight of -0.015 but is not significant in contrast to model *Business2* where the treatment has a significant negative regression weight of -1.965 at the 0.10 level. This means the treatment has no significant effect on the amount adolescents spent on the sustainable consumption option related to investments in an own business, compared to model *Business2*. The control variable gender is – just as in model *Business2* – significant at a 0.01 level, with a regression weight of -0.107 which means the effect of gender decreased compared to *Business2*. The control variable *education level* is significant negative with a regression weight of -0.196 ($p<0.001$). In comparison with model *Business2* the level of significance increased, but the effect decreased. *Wealth* is in model *BusinessRC2* – with a regression weight of -0.016 – not significant anymore in comparison with model *Business2*. Being female and obtaining a higher education level are associated with less spendings on the sustainable consumption option related to investments in an own business. Model *SavingsRC2* is the multivariate regression model which includes all six control variables and is the robustness check for model *Savings2*. The treatment is significant positive with a regression weight of 0.104 at the 0.05 level. This means the treatment has a significant positive effect on the amount adolescents spent on the sustainable consumption option related to savings when controlling for all control variables. The effect of the treatment decreased, but the significance level stays the same in

comparison with model *Savings2*. The control variable *income* shows no significant effect in model *SavingsRC2* compared to model *Savings2*. The control variable *wealth* is significant positive with a regression weight of 0.053 at the <0.001 level. The level of significance is similar to model *Savings2*, but the effect of wealth decreased. This indicates that more wealth is associated with more savings.