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Happy people, happy planet

Master thesis
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Abstract

Happiness leads to more sustainable behavior because happiness increases interest in prosocial activities. Furthermore, happiness leads to more openness to negative information and to more forward-thinking. This study measures happiness as overall life satisfaction. It is hypothesized that overall life satisfaction is positively associated with more sustainable behavior through increased awareness of climate change. The relationship is tested performing (logit)regressions and mediation analysis using the data from the Hopebarometer 2018. The results provide evidence in support of the relation between overall life satisfaction and sustainable behavior. However, no evidence is found in support of the relation between life satisfaction and awareness of climate change. Taken together, these findings contribute to the understanding of the spillover effects of happiness.

Key words: *happiness, overall life satisfaction, awareness of climate change, sustainable behavior*

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Section 1. Introduction

In the last decade, climate change has caused many irreversible consequences for our planet. Recent research has proven that the earth is warming up and this has caused rising sea levels, diminishing sea ice and decreasing glaciers (Intergovernmental Panel on Climate Change, 2018). Policymakers and different organizations stimulate people to engage more in sustainable activities or give money to environmental organizations. They do this by using ads and radio or TV commercials to raise awareness of climate change. For example, the commercials for the "national week without meat" in the Netherlands. However, not in many cases is happiness economics considered as a means of raising awareness of climate change and as a consequence an increase in sustainable activities and behavior.

In the literature, there are two main distinctions for the definitions of happiness, namely; eudaimonic and hedonic happiness (Ryan & Deci, 2001). Eudaimonic happiness is concerned with how well you are living your life, it is about the process of life (Deci & Ryan, 2008). On its turn, hedonic happiness consists of two main streams, emotional and cognitive happiness (Diener et al., 2003). For example, cognitive hedonic happiness can be measured as overall life satisfaction (Veenhoven, 2004). People rate their overall life-satisfaction by factors in their daily lives over the long term. Emotional hedonic happiness can be considered as mood in the short term and as affect in the long term (Veenhoven, 2000). This research will focus on the effects of happiness measured as overall life satisfaction.

Previous research has investigated the possible positive spillover effects of happiness. For example, happiness has proven to increase the health of individuals (Fowler & Christakis, 2008). This can partly be explained by the fact that happier individuals tend to eat more healthy products, which increases their health (Garg, Wansink & Inman, 2007). Moreover, positive spillover effects of happiness are also found in the workplace. Happy individuals are more productive and creative (de Neve, Diener, Tay & Xuereb, 2013). Happy individuals are also more social, which promotes better social relations, both in private life and in the workplace (Diener and Seligman, 2002). Lastly, positive spillover effects of happiness are found in prosocial behavior, as happy individuals give more time and money to the community (De Neve et al., 2013) and are more likely to volunteer (Oishi, Diener & Lucas, 2009).

Happiness has a lot of positive consequences. However, research on the benefits of happiness in the environmental domain is rare although it seems likely that these concepts are connected. It is found that happier individuals are more able to process information and act upon this information (Aspinwall, 1988). In addition, happy individuals think more about the future and are more inclined to consider the implications of their present-day actions (de Neve et al., 2013). Next, Aspinwall (1998) found that happy individuals are more capable of reaching their long-term goals, despite the costs

that these goals might induce in the short term. Hence, happier individuals take more time to think about their actions and the consequences of these actions (Guven, 2012). Consequently, as happier individuals are more aware of their actions and future consequences, they should be more aware of climate change and the consequences of their actions for our planet. Lastly, happy individuals show more interest in (pro)social activities compared to less happy individuals (Cunningham, 1998). Causing them to show more interest in climate change and act upon that. In sum, this causes happier individuals to be more aware of climate change and therefore make better decisions both for themselves, e.g. health and for society, e.g. volunteering or sustainable behavior.

Even though previous research on happiness and its implications indicates that there is a connection between happiness and sustainable behavior, previous studies have not directly researched the spillover effects of happiness on sustainable behavior through increased awareness of climate change. This study responds to this gap of knowledge by answering the following research question:

Does life satisfaction increase sustainable behavior through increased awareness of climate change?

The research question will be answered by using the following sub-questions:

Is life satisfaction positively associated with sustainable behavior?
Is life satisfaction positively associated with awareness of climate change?
Is awareness of climate change positively associated with sustainable behavior?

This paper aims to investigate the relationship between overall life satisfaction and sustainable behavior and whether awareness influences this relationship, therefore using mediation analysis. The relationship is researched using regression analysis. The Hopebarometer 2018 from the LISS panel is used for the analysis of the relationship between overall life satisfaction, e.g. self-reported well-being, awareness of climate change and sustainable behavior. The data consists of 1.166 randomly selected respondents of 16 years and older, 905 of these people responded. The respondents had to answer questions about self-reported well-being and questions about the environment. The data is collected in November 2018. The nature of the Hopebarometer 2018 is cross-sectional, which means that only associations can be found in this study, rather than causal relationships

The main contribution of this paper is the introduction of sustainable behavior and awareness of climate change as a possible spillover effect of overall life satisfaction. The relationship between overall life satisfaction and sustainable behavior is something that is not yet broadly researched. Therefore, this paper contributes to the understanding of the broad concept of happiness and its

implications, especially in the environmental domain. Besides, a positive association could contribute to new ways of stimulating sustainable behavior. The stimulation of sustainable behavior should then put its focus on overall life satisfaction and awareness of climate change instead of what activities we want people to engage in.

It is found that overall life satisfaction has a positive association with sustainable behavior. This association holds for older people with a high income. However, no associating of overall life satisfaction and awareness of climate change is found. Additionally, no association of awareness and sustainable behavior is found. The finding that awareness is not the mediating variable contributes to the understanding of the relationship between overall life satisfaction and sustainable behavior. This makes it possible to further narrow down what are the real mediating variables. Finding the real mediating variable(s) could contribute to the understanding of the role of overall life satisfaction in sustainable decision making.

This research paper consists of six main sections. Section 2 reviews relevant literature and in addition to that the hypotheses are developed. Section 3 describes data and the methodology that is used, followed by section 4 which presents the results. The implications of the findings are discussed and some limitations, as well as future avenues for research, are presented in section 5. Section 6 concludes.

Section 2. Theoretical framework

As explained in the introduction, this thesis will focus on the effects of overall life satisfaction on sustainable behavior through increased climate change awareness. In this section, the three concepts will be broadly explained. Finally, the relationship between these concepts will be described.

2.1 Happiness

Happiness has a complex nature and is therefore hard to define. As Delle Fave et al. (2011) show in their paper when asking people what determines their happiness, a variety of different answers are given. Answers ranging from good family connections and being healthy, to having autonomy and enough free time are given. There are many different definitions of what people perceive as happiness. There are two main distinctions for the definition of happiness in the existing literature, namely: eudaimonic happiness and hedonic happiness (Ryan & Deci. 2001). At first, eudaimonic happiness is concerned with how well you are living your life. It is not about an outcome but more about the process of life (Deci & Ryan, 2008). It is about doing what is right, what is worth doing and

living to your best potential (Waterman et al., 2008). As eudaimonic happiness is more concerned with the ethical part of happiness and is harder to measure, it will not be the focus of this research.

However, this research will focus on hedonic happiness. Hedonic happiness is the evaluation of present-day subjective well-being. Hedonic happiness means the evaluation of positive and negative aspects of life satisfaction (Maltby et al., 2005). It concerns the subjective well-being at this moment but also over longer periods (Diener et al., 2003). It concerns the judgment about pleasure and pain or good and bad events in everyday life. The goal is to attain pleasure as much as possible and to avoid pain as much as possible for higher levels of happiness. This kind of happiness is also defined as "satisfaction-with-life", meaning the overall appreciation of one's life as a whole (Veenhoven, 2004). People rate their overall life satisfaction by factors in their daily lives that have a positive or negative influence, like emotional reactions to certain situations and satisfaction with work and marriage (Diener et al., 2003). Therefore, it is an overall judgment of everyday-life made by the conscious state of mind (Veenhoven, 2003).

Hedonic happiness consists of two different components, namely; emotional and cognitive (Diener et al., 2003). At first, the emotional component in the short term consists of feelings of joy and pleasure, often called mood. In the long term, it is the experience of emotions over time, for example concerning the relationship with family or friends. It can be measured with a question like: "how happy are you?". It is often called affect. Secondly, the cognitive component consists of life satisfaction and how you think about your life. It can be measured with a question like: "Overall, how satisfied are you with your life". This research will focus on the cognitive component of hedonic happiness.

In sum, this research will focus on the definition of happiness as satisfaction with life as a whole.

2.2 Benefits of happiness

Previous research has investigated the spillover effects of happiness on different aspects. These previously found spillover effects are the base for this research. There are three important domains on which happiness has its effect (de Neve et al., 2013). The first domain concerns the health domain, the second domain concerns the income, productivity, and organizational behavior domain and, the last domain is the individual and social behavior domain.

Considering the health domain, it has often been found that positive emotions promote health, whereas negative emotions harm health (Cohen & Pressman, 2006). Moreover, happy people experience less pain and report fewer symptoms of illness (Cohen & Pressman, 2006). The increase in health through happiness can be directly or indirectly. Firstly, happiness can directly increase health.

Happiness decreases the chance of getting certain diseases, the number of colds someone is experiencing, and the rate of infections (Cohen et al., 2003). In addition, Davidson et al. (2010) found that positive affect increases the overall health, e.g. decreases cholesterol and decreases bacterial infections. Besides, happiness decreases coronary heart diseases (Davidson et al., 2010). One percentage point increases in happiness decreases the rates of coronary heart diseases with 22%. Lastly, Bhattacharyya et al. (2008) found that happiness had a positive effect on levels of heart rate variability. Heart rate variability says something about the time intervals between heartbeats. Secondly, happiness can indirectly increase health through increased health behaviors. People in a sad state ate more fattening foods, like M&M's, and people in a happy state ate more healthy food (Garg et al., 2007). Blanchflower et al. (2013) found a positive association between happiness and the consumption of healthy foods like fruits and vegetables. Besides, Davidson et al. (2010) found that happy people are less likely to smoke. All these behaviors have a positive effect on health. Some of these benefits are of importance for this study. For example, happiness increases health behaviors like eating less unhealthy products. This states that happiness leads to more focus on the consequences of healthy or unhealthy choices made today. Thus, happiness leads to more awareness of the future consequences of choices made today in the health domain. This could also lead to more awareness of the future consequences of choices in the environmental domain. In sum, happiness leads to more future focus and more awareness of choices made today. This could also lead to more focus on the consequences of choices for the environment.

Next, income, productivity, and organizational behavior. Happiness has a positive influence on productivity, creativity, and cooperation within the workplace (Neve et al., 2013). As pointed out before, happy individuals are healthier. This leads to less sick days so employees can simply do more work. Similarly, Oswald et al. (2015) found happiness increased productivity with 12%. This increased productivity applies to both the long term and short term. In addition, happiness leads to higher individual sales revenue (Peterson et al., 2011). Moreover, happiness also has a positive influence on cooperation within the workplace by promoting social relationships (Diener & Seligman, 2002). These better social relationships lead to better cooperation. Finally, Aspinwall (1998) found that judgments made by happy people are more likely to be creative. Amabile et al. (2015) confirm this as they found that happiness positively influences creativity within the workplace. In sum, happiness makes people more productive.

Finally, the individual and social behavior domain. Happiness is found as a determinant of different social behaviors. Research has found that happiness leads to more helpfulness (Carlson et al., 1988). Examples are increases in volunteering activities, donations to charity and, an interest in (pro)social

activities (Cunningham, 1988). Happy people also have greater compassion and sympathy and will be able to better understand someone else's perspective, which will lead to making better (pro)social decisions (Nelson, 2009). Furthermore, happiness leads to better individual decisions. For example, Guven (2012) found that happiness leads to more savings and less consumption. This is because happiness leads to a different discount rate, which puts more importance on the future. All in all, it is found that happiness leads to a better focus, more attention and that it leads to better processing of information (de Neve et al., 2013). This causes more prosocial behavior. For example, the different discount rate leads to a better understanding of long-term and short-term costs and benefits of the decisions that are made (de Neve et al., 2013). Therefore, happy individuals will be able to make better decisions for society and themselves.

2.3 Awareness of climate change

Awareness of climate change is the extent to which an individual is aware or unaware of the rising temperature on earth caused by humans. Thus, awareness of climate change gives a degree to what level people are conscious about the rising temperature caused by humans and its consequences. The highest levels of awareness are found in developed countries. Approximately 90% of the people in the developed world report that they are aware of climate change. In contrast, the opposite is happening in third world countries. The majority of the people there, over 65%, reports that they have never heard of climate change (Lee et al. 2015).

There are a lot of different factors that influence the degree of climate change awareness. For example, the awareness depends on the education level, age or gender (Sampei & Aoyagi-Usui, 2009). Lee et al. (2015) found that education level is the most important cause of climate change awareness. This means that improving the overall education level would increase the level of awareness. Besides, the degree of media that gives attention to climate change has its influence on the level of awareness (Lee et al., 2015). The researchers point out that the amount of media has much more influence on awareness than the content of the media. This means that significantly more exposure to media talking about climate change positively influences the awareness of climate change. In addition, if people experience changes in local weather and temperature, they have a higher level of awareness (Lee et al. 2015).

2.4 Sustainable behavior

The first definition of sustainability that was accepted comes from the United Nations. They describe sustainability as: "development that meets the need of the present without compromising the ability

of future generations to meet their own needs" (Minton et al., 2012). This means that people can live according to their own needs and improve their welfare. However, living according to their own needs should not harm future generations (Moldan et al., 2012). Future generations should not feel the consequences of the generations before them. Therefore, no harm should be done to the environment and the temperature rise should be kept as low as possible. This can be done by living in a sustainable manner. As Moldan et al. (2012) point out in their paper, the OECD proposed four ways that contribute to sustainable behavior. The first one is regeneration; re-using sources if possible. The second one is substitutability; sources that cannot be re-used should be used carefully and at limited levels. The third one is assimilation; do not release too much pollution substances into nature. The last one is to avoid irreversibility. All in all, showing behavior that covers one or more of these aspects can make sure that future generations will not be harmed. Therefore, this is considered sustainable behavior.

In sum, sustainable behavior covers all sorts of behaviors that do not harm the planet and saves the environment for future generations.

2.5 Relationship between happiness, awareness of climate change and sustainable behavior

As pointed out before, several positive benefits of happiness are found in the health domain, income and productivity domain and, the individual and social behavior domain. However, research on the benefits of happiness in the domain of (pro)environmental behavior is rare.

Firstly, it is found that happiness leads to more interest in several (pro)social activities (Cunningham, 1988). This leads to an increased interest in activities that contribute to the conservation of the environment. As explained before, overall life satisfaction will be used to measure happiness. All in all, this leads to the first hypothesis:

Overall life satisfaction is positively associated with sustainable behavior.

Second of all, people in a positive mood are more open to negative information and a positive mood plays a positive role in considering information (Aspinwall, 1998). This means that happiness increases interest in negative information, for example, information about climate change. Besides, it is found that happiness leads to a better consideration and processing of the information about climate change (Aspinwall, 1998). Advertisement about climate change, e.g. green advertisement, is therefore better noticed and more considered. This increases awareness of the problem.

Happiness also indicates a different discount rate, which focuses more on the future. Therefore, happy people are more forward-thinking and better consider the consequences for the future of their present-day actions (de Neve et al., 2013). Happiness leads to a better consideration of the positive and negative effects of choices and actions (Guven, 2012). Happy individuals take more time to consider these consequences. In sum, happiness leads to a better consideration of actions and choices and their consequences. These two reasons together lead to the second hypothesis:

Overall life satisfaction is positively associated with awareness of climate change.

On its turn, awareness of climate change can lead to behavioral change (Semenza et al., 2008). People who reported that they were aware of climate change, also reported that they have changed their behavior to more sustainable behavior. For example, they reported that they reduced energy usage at home and made more use of recycling. Besides, Halady & Rao (2010) found in their experiment that awareness of climate change leads to climate-friendly behavioral change. This leads to the last hypothesis:

Awareness of climate change is positively associated with sustainable behavior.

Section 3. Methodology & data description

This section explains the measurements of interest and provides some descriptive statistics of the data. In addition, the relationship between the variables of interest are discussed before turning to the statistical analyses.

3.1 Data

The Hopebarometer 2018 from the LISS panel is used for this analysis about the relationship between overall life satisfaction, awareness of climate change and sustainable behavior. The data consists of 1.166 randomly selected participants of 16 years and older. From all selected participants, 905 of these people responded and there are 893 complete responses. The respondents answered questions on self-reported well-being, environment and, hope. This research only uses data from questions about self-reported well-being and the environment. For a complete description of all used questions, see appendix 1. The data is collected in November 2018. The nature of the Hopebarometer 2018 is cross-sectional, meaning that possible findings consider associations rather than causal relationships.

3.2 Measurements

3.2.1 Measuring happiness

To measure overall life satisfaction, a single question from the Hopebarometer 2018 is used, namely: "Taking everything together, how satisfied are you with your life as a whole?". Respondents had to answer this question on a scale from 1 to 10, with 1 indicating very dissatisfied and 10 indicating very satisfied with their lives. Even though previous research raised the question whether this really measures happiness, there is no evidence that answers on this question are biased or that people present themselves as happier than they actually are (Veenhoven, 2004). In addition, the correlation between the single question and the Oxford Happiness Inventory and Satisfaction with Life Scale was highly significant and positive (Abdel-Khalek, 2006). This means that the single-item question is reliable and can be used to measure happiness.

3.2.2 Measuring awareness of climate change

To measure the awareness of climate change, one question from the Hopebarometer 2018 is used. This question asks people how scientists think about global warming. The answers are ranging from 1 to 3. With 1 indicating that most scientists do not think the earth is warming up, value 2 indicates that scientists are not sure about it and value 3 indicates that scientists think that the earth is warming up. The option "no opinion" is recoded into a missing value so that this answer is not taken into account for the analysis. In the analyses, value 1 is considered as low awareness, value 2 is considered as medium awareness and value 3 is considered as high awareness.

This question is taken for the measurement of awareness, as it is assumed that this covers the concept of awareness. If people indicate that scientists think that the earth is warming up, they show that they are aware of the problem of global warming. If people answer that scientist don't think the earth is warming up, they show they are not aware of the problem. Therefore, this question is used to measure awareness of climate change.

3.2.3 Measuring sustainable behavior

To measure sustainable behavior, questions about the participation in sustainable activities are used. For this measure, four question from the Hopebarometer 2018 are used. These questions all concern sustainable activities, like recycling and diminishing water usage. The average of the answers is used to make one variable for these four questions. The complete description of the questions can be found in appendix 1. The answers of these questions are ranging on a scale from 1 to 7. A higher value indicates more participation in sustainable activities. Cronbach's alpha of these four questions is equal to 0.6916, indicating that internal consistency is acceptable (Gliem and Gliem, 2003). Therefore, the

four questions will be used for this measurement. The correlations between these four questions can be found in table 1. As can be seen, all correlations are approximately 0.3 or higher

Table 1. Correlations sustainable behavior

	Products (Q27)	Less water (Q28)	Recycling (Q29)	Sustainable energy (Q30)
Products (Q27)	1			
Less water (Q28)	0,5095*	1		
	(0,00)			
Recycling (Q29)	0,2897*	0,3284*	1	
	(0,00)	(0,00)		
Sustainable energy (Q30)	0,3686*	0,3408*	0,3502*	1
	(0,00)	(0,00)	(0,00)	

Note: * indicates significance at 1% level and p-value in parentheses.

3.2.4 Control measures

Firstly, a control variable for gender and age is included. Since women tend to have greener shopping habits than men, this could lead to more sustainable behavior for women (Minton et al., 2012). Moreover, age has a negative influence on the knowledge of the environment (Minton et al., 2012). This means that older people might be less aware of global warming, although they find that older people make more use of recycling. Finally, a control variable for net income is included. Sustainable activities, such as using green energy, are in some cases more expensive. Therefore, people with a higher income are more likely to engage in these activities.

3.3 Descriptive statistics

This part of section 3 provides descriptive statistics about the sample and the measures of interest. In addition, the relationship between the variables of interest is discussed prior to the statistical analyses.

3.3.1 Descriptive statistics

Table 2 and 3 below provide descriptive statistics about the variables used in this analysis.

First, some descriptives about the sample can be found in table 2. The average age of this sample is 52 years with a standard deviation of 18.39. The youngest respondent is 16 years old and the oldest respondent is 91 years old. The sample consists of 45,5% male respondents. The net income is measured in euros per month. The mean income is €1620,99 with a standard deviation of 1062,19. The net income is ranging from €0,- to €6.500,-.

Table 2. Descriptive Statistics

	Observations	Mean	Frequency	SD	Minimum	Maximum
Age	905	52,22	-	18,39	16	91
Gender (male)	905	-	45,5%	-	0	1
Monthly net income	709	1620,99	-	1062,19	0	6.500
Life satisfaction	900	7,52	-	1,37	1	10
Sustainable behavior	893	4,81	-	1,23	1	7

Note: Frequency rather than mean is shown for binary variables.

Table 3. Descriptives about awareness

	Frequency	Percentage
"Most scientist don't think the earth is warming up"	9	1,15%
"Most scientist are not sure if the earth is warming up"	70	8,94%
"Most scientists think the earth is warming up"	704	89,91%

Tables 2 and 3 also show the descriptives of the variables of interest, namely; overall life satisfaction, awareness and, sustainable behavior. Firstly, overall life satisfaction is measured on a scale from 1 to 10, with a higher value indicating a higher degree of life satisfaction. The average score on the life satisfaction scale is equal to 7,52 with a standard deviation of 1,37. Next, awareness of climate change is measured on a scale from 1 to 3, with a higher score indicating a higher degree of awareness. This variable is a categorical variable. Table 3 shows the frequencies of the answers given. Most people indicated that scientists think the earth is warming up. Almost no respondent indicated that they do not think the earth is warming up. Lastly, the measure for participating is sustainable activities is measured on a scale from 1 to 7. The mean score on this scale is equal to 4,81 with a standard deviation of 1,23.

3.3.2 Relationships

The Spearman correlation was calculated to assess the correlations between the variables of interest. In table 4, the results are shown. There is no significant correlation between overall life satisfaction and awareness of climate change. However, a positive correlation between participation in sustainable activities and overall life satisfaction is found. In addition, there is also a positive correlation between awareness of climate change and participation in sustainable activities. Therefore, prior to any statistical analyses, there seems to be no clear relationship between awareness of climate change and overall life satisfaction. However, the correlations show some relation between overall life satisfaction and sustainable behavior and also between awareness of climate change and sustainable behavior.

Table 4. Spearman's correlations

	Life satisfaction	Awareness	Sustainable behavior
Life satisfaction	1		
Awareness	0,0455	1	
	(0,2036)		
Sustainable behavior	0,1382*	0,1363*	1
	(0,0000)	(0,0001)	

Note: * indicates significance at 1% level and p-value in parentheses.

3.4 method

To analyze the relationships between the variables of interest, a mediation analysis will be used. Awareness of climate change is the mediating variable. The analysis is visualized in image 1. The variables for overall life satisfaction and sustainable behavior will be treated as continuous variables, as they have more than 5 categories (Rhemtulla, Brosseau-Liard, 2012). The mediating variable, awareness of climate change, will be used as a categorical variable, since it has only 3 categories. The association between overall life satisfaction and sustainable behavior, effect C, in image 1, is studied using an OLS regression. Next, the association between awareness of climate change and sustainable behavior, effect B, will also be studied using an OLS regression. The last association, effect A, between overall life satisfaction and awareness is studied using ordered logit regression.

Control variables for gender, age and income are included. The control variable for age will also be used as a squared variable to check for quadratic effects. The control variable for income will be used as the logarithm of the monthly net income, as income has a log normal distribution.

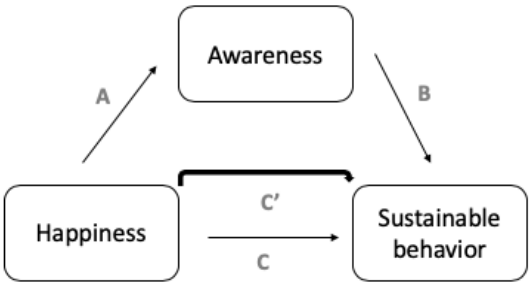

Image 1: mediation analysis

Section 4. Results

This section presents the results of the models used to test the three hypotheses and ultimately answer the research question.

4.1 Main results

4.1.1 Hypothesis 1

In order to answer the first hypothesis; *overall life satisfaction is positively associated with sustainable behavior*, overall life satisfaction is regressed on sustainable behavior. The output of this OLS regression is shown in table 5 below. The coefficient for overall life satisfaction is approximately 0.08, suggesting that a 1-point increase in the level of overall life satisfaction, is associated with an increase in the level of sustainable behavior with 0.08 points. This coefficient is positive and significant at the 5% level, thereby supporting hypothesis 1. However, since an increase of 0.08 points on a 7-points scale is low, it should be noted that the effect is rather small.

As displayed in table 5, gender and age have significant coefficients. The coefficient for gender is negative, suggesting that males score 0.2 points lower on sustainable behavior than females. This coefficient is significant at the 5% level. Furthermore, the coefficient for age is positive and significant at the 1% level, indicating that older people score higher on sustainable behavior. However, the coefficient for age squared is negative and significant at the 1% level, indicating that after a certain age, sustainable behavior decreases. Lastly, the coefficient for income is negative. Since this coefficient is not significant, no conclusions can be made on the relationship between income and sustainable behavior.

Table 5. OLS regression on sustainable behavior

	(1)
	Sustainable behavior
Overall life satisfaction	0.0831**
	(0.0353)
Gender	-0.232**
	(0.103)
Age	0.0844***
	(0.0190)
Age squared	-0.000660***
	(0.000179)
Income	-0.0988
	(0.0739)
Constant	2.631***
	(0.637)
Observations	618
R-squared	0.087

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.1.2 Hypothesis 2

In order to answer the second hypothesis; *overall life satisfaction is positively associated with awareness of climate change*, overall life satisfaction is regressed on awareness of climate change using an ordered logit regression. As the direct coefficients from this ordered logit regression cannot be interpreted, the output as average marginal effects is shown in Table 6 below. The marginal effects can be interpreted as the extent to which overall life satisfaction increases or decreases the probability someone belongs to one of the three awareness groups, e.g. low awareness, medium awareness and high awareness.

The coefficients for overall life satisfaction are not significant in any group. Hence, it can be concluded that there is no association between happiness and awareness of climate change. All in all, no evidence is found to support hypothesis 2.

Table 6. Marginal effects

	(1) Awareness of climate change
Overall life satisfaction	
Low Awareness	-0.0003 (0.0007)
Medium Awareness	-0.0029 (0.0082)
High Awareness	0.0032 (0.0090)
Observations	559
Pseudo R-squared	0.0247

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

4.1.3 Hypothesis 3

In order to answer the third hypothesis; *awareness of climate change is positively associated with sustainable behavior*, awareness of climate change is regressed on sustainable behavior. The output of this OLS regression is shown in Table 7 below. The coefficients are not significant. Therefore, it cannot be concluded that there is any association between awareness of climate change and sustainable behavior. This means that no evidence is found to support hypothesis 3.

Table 7. OLS regression on sustainable behavior

		(1)
		Sustainable behavior
Awareness	Low awareness	(base category)
	Medium awareness	-0.197
		(0.645)
	High awareness	0.495
		(0.628)
Observations		554
R-squared		0.105

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

4.2 Summary results

From the previous results, we can conclude that there is a positive association between overall life satisfaction and sustainable behavior, this finding is in support of hypothesis 1. However, contrary to our expectations, we do not find a significant association between life satisfaction and awareness of climate change, so we cannot confirm hypothesis 2. Lastly, we did not find a significant association between awareness of climate change and sustainable behavior, so we cannot confirm hypothesis 3. Therefore, we cannot confirm the hypothesis that life satisfaction is positively related to sustainable behavior because it generally goes together with higher environmental awareness.[1]

Table 8. Hypotheses

#		Supported?
1	Happiness is positively associated with sustainable behavior	Yes
2	Happiness is positively associated with awareness of climate change	No
3	Awareness of climate change is positively associated with sustainable behavior	No

To answer the research question, a positive association is found between overall life satisfaction and sustainable behavior. However, it is not awareness that mediates this relationship. In addition, it should be kept in mind that the increase in sustainable behavior because of an increase in overall life satisfaction is very small.

[1] The same results are found when using a different measure for happiness. See appendix 2.

4.3 Additional analyses

The results that we found when using overall life satisfaction and eudaimonic happiness are not the results that were expected. This might be due to the methodology or due to heterogeneity in the relationships. In order to distinguish the cause of these unexpected results, additional analyses are performed. For example, the results that we found might be different when using a different measurement for awareness. Moreover, the results might differ for people with a different financial situation.

The first possible explanation for not finding support for hypotheses 2 and 3 could be found in the methodology. It is possible that the single question used for awareness does not correctly measure the concept of awareness. Therefore, two other questions are used to do the analyses. The first question is: “are you worried about climate change or global warming?”. It is assumed that a higher level of worrying about climate change corresponds to the concept of more awareness, as people have to be aware of the problem to be able to worry about it. A possible issue with this question is that it likely leads to a smaller group that counts as ‘aware’, because people not only need to be aware of climate change, but also need to worry about it in this question. The second question used is: “when you think about what is said in the news, do you think the problem of global warming is exaggerated, described in the right way, or underestimated?”. It is assumed that when people think the news is not exaggerating the problem, this corresponds to more awareness. This is because people have to be aware of climate change, to find that the problem is not overestimated. A possible issue with this question is that there are different versions of ‘the news’ that might write differently about climate change. This could lead to different perceptions of whether the problem is underestimated. Both questions are recoded in such a way that a higher value indicates a higher degree of awareness (for a complete description of variables, see appendix).

The second possible explanation why no evidence is found for hypotheses 2 and 3 could be that the effect is different for different groups. At first, for people with a better financial situation, the association between awareness and sustainable behavior could be stronger. After all, these people have the money to behave in a more sustainable manner. The association could be negative for people with worse financial situations, as they do not have the resources and money to behave in a sustainable manner. As the relation could be different for different groups, it might be that the effect can only be found in specific groups and not the population as a whole. Besides different financial situations, it is possible that the effect depends on age. For example, students who live in a student flat with different people, have less opportunities to recycle. However, a grown-up, who is head of the household, has more influence on the behavior of the household. Therefore, the relation between

awareness and sustainable behavior could be more positive for older ages. All in all, different income groups and different age groups will be used in the analyses.

4.3.1 Results different measurements

For the first additional analysis overall life satisfaction is regressed on environmental worry and opinion on media coverage. Since awareness is not part of the first hypothesis, hypothesis 1 will not be tested again.

Firstly, for hypothesis 2, overall life satisfaction is regressed on environmental worry and opinion on media coverage using an ordered logit regression. As the direct results from this ordered logit regression cannot be interpreted, the output as average marginal effects are shown in Table 9 below. The first model shows the regression when environmental worry is used, the second model shows the regression when opinion on media coverage is used.

In the first model, the coefficient for overall life satisfaction, for the lowest group, is approximately 0.014. This indicates that when overall life satisfaction increases with 1 point, the probability of being in the lowest group of worrying, increases with 0.014 percentage points. In addition, the coefficient for overall life satisfaction, for the highest group of worrying, is approximately -0.013, suggesting that when overall life satisfaction increases with 1 point, the probability of being in the highest group of worrying decreases with 0.013 percentage points. These coefficients are significant at the 10% level. The coefficient for the medium group of worrying is not significant, suggesting that there is no effect for the medium group. The results found are in the opposite direction of what was expected according to hypothesis 2. The results show that overall life satisfaction is associated with lower levels of awareness. Therefore, these findings suggest that there might be a reverse relationship between overall life satisfaction and awareness.

Table 9. Marginal effects

		(1) Environmental worry	(2) Opinion on media coverage
Overall life satisfaction			
	Low	0.01403*	0.0026
		(0.0078)	(0.0080)
	Medium	-0.0011	0.0017
		(0.0021)	(0.0053)
	High	-0.0129*	-0.0043
		(0.0072)	(0.0132)
Observations		604	783
Pseudo R-squared		0.0143	0.0035

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

Looking at the regression using opinion on media coverage, no significant coefficients of overall life satisfaction are found. This means that no association between overall life satisfaction and opinion on media coverage can be suggested. Therefore, no evidence is found in support of hypothesis 2 when this question is used as a proxy for awareness.

All in all, when using opinion on media coverage as a proxy for awareness, hypothesis 2 is again not supported. However, when using environmental worry, results are found for a reversed relation; overall life satisfaction is associated with lower levels of awareness.

Secondly, for hypothesis 3, environmental worry and opinion on media coverage are regressed on sustainable behavior. The output of this OLS regression is shown in table 10 below. The first model shows the regression when environmental worry is used, the second model shows the regression when opinion on media coverage is used.

As can be seen, the coefficients are significant in both regressions. In the first model, the coefficient for the medium group of environmental worry is 0.67. This indicates that being in the medium group of being worried, compared to being in the low group, is associated with an increase in sustainable behavior of 0.67 points. The coefficient for the high group is 1.26. Indicating that being in the high group, compared to being in the low group, goes together with an increase in sustainable behavior of 1.26 points. These coefficients are significant at the 1% level. Sustainable behavior is ranging on a scale from 1 to 7 points. All in all, these results support hypothesis 3 when environmental worry is used as a proxy for awareness.

In the second model using opinion on media coverage, the coefficient for the medium group is 0.44. This indicates that being in the medium group, compared to being in the low group, is associated with an increase in sustainable behavior of 0.44 points. The coefficient for the high group is 0.73. This indicates that being in the high group, compared to being in the medium group, is associated with an increase in sustainable behavior of 0.73 points. These coefficients are significant at the 1% level. All in all, the results support hypothesis 3 when opinion on media coverage is used as a proxy for awareness.

Table 10. OLS regression on sustainable behavior

		(Environmental worry)	(Opinion on media coverage)
		Sustainable behavior	Sustainable behavior
Worry/media	Low	(base category)	(base category)
	Medium	0.673*** (0.178)	0.442*** (0.155)
	High	1.257*** (0.155)	0.733*** (0.156)
Observations		599	563
R-squared		0.139	0.124

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

All in all, when using opinion on media coverage as a proxy for awareness, no evidence is found to support hypothesis 2. However, when using environmental worry, a significant result is found in the opposite direction to what was expected. It is found that higher levels of overall life satisfaction are associated with lower levels of awareness. Next, for hypothesis 3, a significant association is found for both proxies. Higher levels of environmental worry or opinion on media coverage are associated with higher levels of sustainable behavior. These results do support hypothesis 3. As hypothesis 2 is still not supported when using opinion on media coverage as a proxy, a mediating effect is not possible.

Table 11. Hypothesis when using different measurements for awareness

#		Supported? (Worry)	Supported? (Media coverage)
1	Overall life satisfaction is positively associated with sustainable behavior	Yes	Yes
2	Overall life satisfaction is positively associated with awareness of climate change	opposite direction	No
3	Awareness of climate change is positively associated with sustainable behavior	Yes	Yes

However, when using environmental worry as proxy for awareness, an association between overall life satisfaction and awareness is found. Therefore, it could be the environmental worry is the

mediating variable. This is tested using the process tool (Hayes, 2012). When performing the mediation analysis, it is found that there is no mediating effect.

Table 12. Mediation analysis

	Direct effect Sustainable behavior	Indirect effect Sustainable behavior	Total effect Sustainable behavior
Overall life satisfaction	0.1098** (0.0335)		0.0922** (0.0346)
Environmental worry	0.6557*** (0.0988)	-0.0176 (0.0104)	
Observations	599	599	599

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

The total effect of life satisfaction, when there is no mediating variable in the model, is 0.1098. This effect is significant at the 5% level. The indirect effect of life satisfaction, that passes through environmental worry is not significant. Therefore, there is no mediating effect of environmental worry.

4.3.2 Results different financial groups

For the second additional analysis, different financial groups are used to perform the analyses. The groups are divided according to their gross monthly income in euros. The analyses will be performed for four different groups shown in table 13. The groups are divided such that every group has approximately the same number of people. For this analysis, the first measure for awareness is used and in addition the two proxies are also used.

Table 13. Different groups financial situations

	Frequency	Percentage
€500 to €1500	95	10,50%
€1501 to €2500	118	13,04%
€2501 to €4000	147	16,24%
€4001 and more	77	8,51%

The results for hypothesis 1 for the different financial groups can be found in table 14. The results show that overall life satisfaction is associated with more sustainable behavior for the third group. In that group, an increase in overall life satisfaction with 1 point is associated with an increase in sustainable behavior of 0.16 points. This coefficient is significant at the 5% level. For the other groups, no significant results are found. In the first analysis, it was found that overall life satisfaction is associated with more sustainable behavior. This analysis shows that this relation only holds for people

with an income between €2105 and €4000. Therefore, hypothesis 1 is only supported for people with an income between €2105 and €4000.

Table 14. OLS regression on sustainable behavior

Financial situation	(€500 to €1500)	(€1501 to €2500)	(€2501 to €4000)	(€4001 and more)
	Sustainable behavior	Sustainable behavior	Sustainable behavior	Sustainable behavior
Overall life satisfaction	0.021	0.0035	0.1595**	0.1741
	(0.095)	(0.0896)	(0.077)	(0.1231)
Observations	85	94	127	73
R-squared	0.16	0.134	0.074	0.20

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

The results for hypothesis 2 for the different financial groups, when using the first measurement for awareness is used, are displayed in table 15. No significant coefficient of overall life satisfaction in any of the groups is found. These results are no different from the first analysis. Therefore, there is still no evidence in support of hypothesis 2[2].

Table 15A. Marginal effects of ordered logit regression (awareness)

Financial situation	(€500 to €1500)	(€1501 to €2500)	(€2501 to €4000)	(€4001 and more)
	Awareness	Awareness	Awareness	Awareness
Overall life satisfaction				
Low Awareness			-0.001	
			(0.0019)	
Medium Awareness	-0.005	0.0127	-0.011	0.0039
	(0.0274)	(0.0114)	(0.0202)	(0.0191)
High Awareness	0.005	-0.0127	0.0121	-0.0039
	(0.0274)	(0.0114)	(0.0218)	(0.0191)
Observations	75	86	120	71
Pseudo R-squared	0.1844	0.0739	0.0486	0.2343

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

However, when using environmental worry as a proxy for awareness, significant results are found, as can be seen in table 15B. Overall life satisfaction is associated with a higher probability of being in the low category of awareness only in the two lowest income groups. For people with an income ranging

[2] The same results are found when using opinion on media coverage as a proxy, see appendix 4.

from €500 to €1500, higher overall life satisfaction increases the probability of being in the low category of awareness with 0.0596 percentage points. For people with an income ranging from €1501 to €2500, higher overall life satisfaction increases the probability of being in the low category of awareness with 0.0254 percentage points. These results are significant at the 5% level. In addition, higher overall life satisfaction is associated with a lower probability of being in the high category of awareness for the two lowest income groups. For people with an income ranging from €500 to €1500, overall life satisfaction decreases the probability of being in the high category of awareness with 0.0392 percentage points. For people with an income ranging from €1501 to €2500, overall life satisfaction decreases the probability of being in the high category of awareness with 0.0304 percentage points. These results are significant at the 10% and 5% level, respectively. All in all, the results indicate that overall life satisfaction is associated with lower levels of awareness when monthly income is between €500 and €2500. Like the results in the main analysis, these findings are contrary to the expectations in hypothesis 2.

Table 15B. Marginal effects of ordered logit regression (environmental worry)

Financial situation	(€500 to €1500)	(€1501 to €2500)	(€2501 to €4000)	(€4001 and more)
	Environmental worry	Environmental worry	Environmental worry	Environmental worry
Overall life satisfaction				
Low worry	0.0596**	0.0254**	-0.0129	-0.0219
	(0.0302)	(0.0128)	(0.0185)	(0.0364)
Medium worry	-0.0203	0.0050	0.0028	-0.0040
	(0.0195)	(0.0123)	(0.0052)	(0.0115)
High worry	-0.0392*	-0.0304**	0.0102	0.0259
	(0.0216)	(0.0154)	(0.0150)	(0.0428)
Observations	84	96	124	73
Pseudo R-squared	0.0493	0.0699	0.0169	0.0355

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

The results for hypothesis 3 for the different financial groups, when using the first measurement for awareness, can be found in table 16A. Awareness only has a significant coefficient in the second and third group. For the second group, being in the high category, compared to the low category, increases sustainable behavior with 0,79 points. This coefficient is significant at the 5% level. For the third group, being in the high category for awareness, compared to being in the low category, increases sustainable behavior with 1,3 points. This coefficient is significant at the 1% level. The other groups do not have any significant coefficients of awareness on sustainable behavior. Therefore, only the results of the

second- and third-income group are in support of hypothesis 3. This indicates that awareness is associated with more sustainable behavior when income is between €1501 and €4000.

Table 16A. OLS regression on sustainable behavior

Financial situation		(€500 to €1500)	(€1501 to €2500)	(€2501 to €4000)	(€4001 and more)
		Sustainable behavior	Sustainable behavior	Sustainable behavior	Sustainable behavior
Awareness	Low awareness	(base category)	(base category)	(base category)	(base category)
	Medium awareness			0.4067	
				(0.334)	
	High awareness	0.3039	0.789**	1.299***	0.293
		(0.3542)	(0.3968)	(0.256)	(0.2835)
Observations		75	82	120	71
R-squared		0.18	0.14	0.126	0.177

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

In addition, when using environmental worry as a proxy for awareness, awareness only has a significant coefficient in the last two groups as can be seen in table 16B. For the third group, being in the high category, compared to the low category, increases sustainable behavior with 1,751 points. This coefficient is significant at the 1% level. For the last group, being in the high category for awareness, compared to being in the low category, increases sustainable behavior with 1,443 points. This coefficient is significant at the 1% level. Because the scale for sustainable behavior is ranging from 1 to 7, an increase of 1,75 and 1,44 should be considered a big increase. The first two groups do not have any significant coefficients of awareness on sustainable behavior. Therefore, only the results of the last two income groups are in support of hypothesis 3. This indicates that awareness goes together with more sustainable behavior when income is higher than €2501.[3]

[3] The same results are found when using opinion on media coverage as a proxy, see appendix 4.

Table 16B. OLS regression on sustainable behavior (using environmental worry)

Financial situation		(€500 to €1500)	(€1501 to €2500)	(€2501 to €4000)	(€4001 and more)
		Sustainable behavior	Sustainable behavior	Sustainable behavior	Sustainable behavior
Environmental worry	Low	(base category)	(base category)	(base category)	(base category)
	Medium	0.365	0.136	1.256***	0.866**
		(0.380)	(0.588)	(0.311)	(0.358)
	High	0.844	0.522	1.751***	1.443***
		(0.619)	(0.753)	(0.347)	(0.383)
Observations		84	92	124	73
R-squared		0.206	0.138	0.188	0.295

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

It can be concluded that using different financial groups shows that overall life satisfaction only is associated with more sustainable behavior when income is between €2501 and €4000. Furthermore, the results show that awareness of climate change is associated with more sustainable behavior, but only when people have a monthly income of at least €1501 and maximum €4000. So, hypothesis 1 is supported when income is between €2501 and €4000 and hypothesis 3 is supported when income is between €1501 and €4000.

In addition, when using the environmental worry as a proxy for awareness, it is found that overall life satisfaction goes together with less awareness for people with a low income, namely, income between €500 and €1501. This is in the opposite direction of what hypothesis 2 expected. Furthermore, the results find that awareness goes together with more sustainable behavior, but only when people have a monthly income of at least €2501. In sum, when using environmental worry as a proxy, hypothesis 3 is supported when income is higher than €2501.

Table 17A. Hypothesis when using age groups.

#		Supported? 500 to 1500	Supported? 1501 to 2500	Supported? 2501 to 4000	Supported? 4001+
1	Overall life satisfaction is positively associated with sustainable behavior	No	No	Yes	No
2	Overall life satisfaction is positively associated with awareness of climate change	No	No	No	No
3	Awareness of climate change is positively associated with sustainable behavior	No	Yes	Yes	No

Table 17B. Hypothesis when using age groups and environmental worry as proxy.

#		Supported? 500 to 1500	Supported? 1501 to 2500	Supported? 2501 to 4000	Supported? 4001+
2	Overall life satisfaction is positively associated with awareness of climate change	Opposite direction	Opposite direction	No	No
3	Awareness of climate change is positively associated with sustainable behavior	No	No	Yes	Yes

4.3.3 Results different age groups

For the last additional analysis, different age groups are used to perform the analyses. The analyses will be done for four different groups shown in table 18. The first group will be all ages from 15 to 34 years old. The second group will be 35 to 44 years old. The third group will be 45 to 64 years old. The last group will be 65 years old and older. The groups are chosen according to life events. After 65 years, people retire and after that no new life events are happening. Therefore, this group is taken as one. In the other three groups, a different effect is expected. The first group consists of students and people who just started working. The second group consists of people who are already working a few years and have a higher salary than the first group. The third group consist of people in the middle and end of their working career, probably with a good salary and a stable life.

Table 18. Different age groups

	Frequency	Percentage
15 to 34 years old	199	21,99%
35 to 44 years old	97	10,72%
45 to 64 years old	336	37,13%
65 years and older	273	30,70%

The results for hypothesis 1 for the different age groups can be found in table 19. It can be seen that overall life satisfaction only has a significant coefficient for the group 45 to 64 years old. An increase in overall life satisfaction with 1 point is associated with an increase of sustainable behavior with 0.113 points. This coefficient is significant at the 5% level. For the other groups, there is no significant coefficient of overall life satisfaction. In the previous analysis, it was found that overall life satisfaction is associated with more sustainable behavior. This analysis shows that this only holds for people who are between 45 and 64 years old. The results for people between 45 to 64 years old are in support of hypothesis 1. This is in line with the previous finding that overall life satisfaction only is associated with more sustainable behavior for people with income between 2501 to 4000, as income increases when you get older and decreases when you retire.

Table 19. OLS regression on sustainable behavior

Age category	(15 to 34 years)	(35 to 44 years)	(45 to 64 years)	(65+ years)
	Sustainable behavior	Sustainable behavior	Sustainable behavior	Sustainable behavior
Overall life satisfaction	0.0399	-0.0389	0.113**	0.0834
	(0.114)	(0.128)	(0.0504)	(0.0516)
Observations	92	63	241	222
R-squared	0.029	0.019	0.0465	0.0594

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

The results for hypothesis 2 for the different age groups, when using the first measure for awareness, can be found in table 20A. No significant effect of overall life satisfaction on awareness in any of the groups is found. These results are no different from the first analysis. Therefore, there is still no evidence in support of hypothesis 2.[4]

Table 20A. Marginal effects of ordered logit regression

Age category	(35 to 44 years)	(45 to 64 years)	(65+ years)
	Awareness	Awareness	Awareness
Overall life satisfaction			
Low Awareness		-0.0015	-0.00038
		(0.0013)	(0.0014)
Medium Awareness	0.0795	-0.0139	-0.0041
	(0.0496)	(0.0122)	(0.0141)
High Awareness	-0.0795	0.0154	0.0044
	(0.0496)	(0.1316)	(0.0155)
Observations	56	216	207
Pseudo R-squared	0.4132	0.0455	0.0177

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

In addition, the results for hypothesis 2 for the different age groups, when using environmental worry as proxy for awareness, can be found in table 20B. It is found that overall life satisfaction is associated with a higher probability of belonging to the low category of awareness for people between 34 and 44 years old, and a lower probability of belonging to the high category of awareness. An increase in

[4] The same results are found when using opinion on media coverage as a proxy, see appendix 5.

overall life satisfaction of 1 point is associated with an increased probability of 0.0599 percentage points of belonging to the low category of awareness. This coefficient is significant at the 5% level. In addition, an increase in overall life satisfaction of 1 point is associated with a decreased probability of 0.0431 percentage points of belonging to the high category of awareness. As with financial groups, an effect opposite of what was expected in hypothesis 2 is found. For people between 35 to 44 years old, more life satisfaction is associated with lower levels of awareness.

Table 20B. Marginal effects of ordered logit regression (using environmental worry)

Age category	(15 to 34 years)	(35 to 44 years)	(45 to 64 years)	(65+ years)
	environmental worry	environmental worry	environmental worry	environmental worry
Overall life satisfaction				
Low	0.0248	0.0599**	0.0127	0.0062
	(0.0196)	(0.0245)	(0.0141)	(0.0105)
Medium	0.0042	-0.0168	-0.0025	0.0014
	(0.0116)	(0.0229)	(0.0037)	(0.0029)
High	-0.0291	-0.0431*	-0.0101	-0.0077
	(0.0234)	(0.0231)	(0.0113)	(0.0128)
Observations	92	62	237	213
Pseudo R-squared	0.0795	0.1395	0.0448	0.0237

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

The results for hypothesis 3 for the different age groups, when using the first measurement for awareness, can be found in table 21A. Awareness only has a significant coefficient in the groups from 35 to 44 years old and 45 to 64 years old. For the age group 35 to 44, being in the high category of awareness, compared to being in the low category, is associated with an increase in sustainable behavior of 1.033 points. This coefficient is significant at the 1% level. For the age group 45 to 64, being in the middle or high group is associated with more sustainable behavior compared to being in the low group. Medium awareness is associated with an increase in sustainable behavior of 0.548 points, compared to low awareness. High awareness is associated with an increase in sustainable behavior of 1.032 points compared to low awareness. The first coefficient is significant at the 5% level and the second coefficient is significant at the 1% level. The other groups do not have any significant coefficients. Therefore, the results of the two middle groups are in support of hypothesis 3, while awareness of climate change is not associated with more sustainable behavior for people younger than 35 or older than 65.

Table 21A. OLS regression on sustainable behavior

Age category		(15 to 34 years)	(35 to 44 years)	(45 to 64 years)	(65+ years)
		Sustainable behavior	Sustainable behavior	Sustainable behavior	Sustainable behavior
Awareness	Low awareness	(base category)	(base category)	(base category)	(base category)
	Medium awareness			0.5482**	-0.8937
				(0.2719)	(1.080)
	High awareness	0.731	1.033***	1.032***	-0.0229
		(0.626)	(0.265)	(0.2386)	(1.0548)
Observations		79	54	215	206
R-squared		0.031	0.024	0.0705	0.1273

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

The results for hypothesis 3 for the different age groups, when using environmental worry as a proxy for awareness, can be found in table 21B. Awareness only has no significant coefficients in the group 35 to 44 years old. For the age group 15 to 34 being in the high category of awareness, compared to being in the low category, is associated with an increase in sustainable behavior of 1.794 points. In addition, being in the medium category of awareness, compared to being in the low category, is associated with an increase in sustainable behavior of 1.16 points. Both coefficients are significant at the 5% level. For the age group 45 to 64 being in the high category of awareness, compared to being in the low category, is associated with an increase in sustainable behavior of 1.266 points. In addition, being in the medium category of awareness, compared to being in the low category, is associated with an increase in sustainable behavior of 0.56 points. The coefficients are significant at the 5% and 1% level, respectively. For the age group 65+, being in the middle or high group goes together with more sustainable behavior compared to the low group.[5] Medium awareness is associated with an increase in sustainable behavior of 0.677 points, compared to low awareness. High awareness is associated with an increase in sustainable behavior of 1.196 points compared to low awareness. The coefficients are significant at the 5% and 1% level, respectively. Therefore, the results in the groups of people younger than 35 and older than 45 are in support of hypothesis 3.

[5] The results found when using opinion on media coverage as a proxy are in appendix 5.

Table 21B. OLS regression on sustainable behavior (using environmental worry)

Age category		(15 to 34 years)	(35 to 44 years)	(45 to 64 years)	(65+ years)
		Sustainable behavior	Sustainable behavior	Sustainable behavior	Sustainable behavior
Environmental worry	Low	(base category)	(base category)	(base category)	(base category)
	Medium	1.160** (0.521)	0.393 (0.624)	0.5636** (0.2613)	0.677** (0.303)
	High	1.794** (0.722)	0.563 (0.798)	1.266*** (0.343)	1.196*** (0.361)
Observations		91	60	236	212
R-squared		0.118	0.035	0.0955	0.1017

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

All in all, using different age groups shows that the association between overall life satisfaction and sustainable behavior is only positive for people who are between 45 and 64 years old. In addition, when using environmental worry, results are found in opposite direction of what hypothesis 2 was expecting. It is found that overall life satisfaction is associated with less awareness. Lastly, the results for age groups 35 to 64 years old are in support of hypothesis 3 when using the first measure for awareness. On the contrary, when using environmental worry, the age groups 15 to 34 and 45+ are in support of hypothesis 3. This difference can be due because the questions could be measuring a different concept.

Table 22A. Hypothesis when using age groups.

#		Supported? 15 to 34	Supported? 35 to 44	Supported? 45 to 64	Supported? 65+
1	Overall life satisfaction is positively associated with sustainable behavior	No	No	Yes	No
2	Overall life satisfaction is positively associated with awareness of climate change	No	No	No	No
3	Awareness of climate change is positively associated with sustainable behavior	No	Yes	Yes	No

Table 22B. Hypothesis when using age groups and environmental worry as proxy.

#		Supported? 15 to 34	Supported? 35 to 44	Supported? 45 to 64	Supported? 65+
2	Overall life satisfaction is positively associated with awareness of climate change	No	Opposite direction	No	No
3	Awareness of climate change is positively associated with sustainable behavior	Yes	No	Yes	Yes

4.4 Summary of all analyses

As can be seen in table 23 below, hypothesis 1 is supported in the main analysis. However, this analysis does not provide evidence in support of hypothesis 2. When using the proxy opinion on media coverage, the analysis does not find any evidence for hypothesis 2 either. Therefore, it can be

concluded that awareness and the proxy opinion on media coverage do not mediate the relationship between overall life satisfaction and sustainable behavior. However, when using environmental worry as a proxy for awareness, the analysis finds an association in the opposite direction of what was expected; more overall life satisfaction seems to be related to less awareness. The mediation analysis showed that environmental worry has no mediation effect on the association between life satisfaction and sustainable behavior. Lastly, when using the first measure for awareness, no evidence is found in support of hypothesis 3. However, when using the 'opinion on media coverage' and 'environmental worry' proxies for awareness, evidence is found in support of hypothesis 3; more awareness is related to more sustainable behavior. This indicates that the operationalization of this construct is of importance.

Furthermore, the additional analyses for different groups show that the relationship between overall life satisfaction and sustainable behavior (hypothesis 1) only holds for certain groups. It only holds when income is between €2501 and €4000, and when people are between 45 and 64 years old. Furthermore, using different financial and age groups does not provide evidence in support of hypothesis 2. It only finds an opposite effect for the first two financial groups (income €500 to €2500) and for the age group 35 to 44 years old when environmental worry is used as a proxy. Lastly, the additional analyses do find evidence in support of hypothesis 3, but only for specific groups. It is found that the relationship between awareness and sustainable behavior only holds when the income is between €1501 and €4000 and the age is between 35 and 64 years old when the first measurement for awareness is used. When environmental worry is used as a proxy for awareness, the relationship between awareness and sustainable behavior only holds when income is higher than €2501, and people are younger than 34 or older than 45.

To answer the research question, a positive association is found between overall life satisfaction and sustainable behavior. The additional analyses show that this relation only holds when people have a monthly income between €2501 and €4000 and when they are between 45 and 64 years old. When awareness is measured as environmental worry, this does not mediate the relationship.

Table 23. Hypothesis for all analyses

	Hypothesis 1 Supported?	Hypothesis 2 Supported?	Hypothesis 3 Supported?
Main analysis	Yes	No	No
Analysis using environmental worry	Yes	Opposite direction	Yes
Analysis using opinion on media coverage	Yes	No	Yes
Financial group €500 to €1500	No	No	No
Financial group €1501 to €2500	No	No	Yes
Financial group €2501 to €4000	Yes	No	Yes
Financial group €4001 and more	No	No	No
Age group 15 to 34 years old	No	No	No
Age group 35 to 44 years old	No	No	Yes
Age group 45 to 64 years old	Yes	No	Yes
Age group 65 years old and older	No	No	No
Using environmental worry as proxy for awareness:			
Financial group €500 to €1500 (environmental worry)	No	Opposite direction	No
Financial group €1501 to €2500 (environmental worry)	No	Opposite direction	No
Financial group €2501 to €4000 (environmental worry)	Yes	No	Yes
Financial group €4001 and more (environmental worry)	No	No	Yes
Age group 15 to 34 years old (environmental worry)	No	No	Yes
Age group 35 to 44 years old (environmental worry)	No	Opposite direction	No
Age group 45 to 64 years old (environmental worry)	Yes	No	Yes
Age group 65 years old and older (environmental worry)	Yes	No	Yes

Section 5. Discussion

5.1 Interpretation and implications

The research question of this paper examines whether overall life satisfaction is positively associated with more sustainable behavior through increased awareness of climate change. The analysis starts with the premise that overall life satisfaction leads to more sustainable behavior because happiness increases interest in prosocial activities. Furthermore, it is hypothesized that there is a positive association between life satisfaction and awareness of climate change. This hypothesis is based on the idea that happiness leads to more openness to negative information and that happiness leads to more forward-thinking. Lastly, it is hypothesized that awareness leads to more sustainable behavior. As section 4.1 found no evidence in support of hypotheses 2 and 3, the analysis does not support the theory that awareness has a mediating effect on the relationship between life satisfaction and sustainable behavior. To answer the research question, there is evidence for a positive relation

between life satisfaction and sustainable behavior. However, there is no evidence that awareness mediates this relationship.

The fact that no evidence is found for hypothesis 2 and 3 could be due to the methodology, e.g. due the specific measure for awareness, or the fact that effects are different for certain groups. When using opinion on media coverage as a proxy for awareness instead of the first measure, the answer to the research question does not change. However, when using the environmental worry as a proxy for awareness, an association between life satisfaction and awareness is found. It is found that an increase in overall life satisfaction in that case is associated with less awareness. This can be explained as this measure probably measures worrying instead of awareness. It could be that happy people overall are less worried, so also about climate change. However, it is found that environmental worry does not mediate the relationship between overall life satisfaction and sustainable behavior. To answer the research question when using environmental worry as a proxy for awareness; it is found that life satisfaction is positively associated with more sustainable behavior. Environmental worry does not mediate this relationship.

The different effects found could be caused by the different concepts that the awareness questions are measuring. In other words, using different measures leads to different results. This indicates that the operationalization of awareness is crucial for the results. The first measure used for awareness best covers the concept of awareness. However, the results using this measure were not as expected and therefore different measurements were used. The other two questions for awareness are trying to measure the underlying concept of awareness, using a different perspective. For example, the first measure for awareness uses how people think scientists think about global warming to measure the underlying concept of awareness. Environmental worry measures how worried people are, in order to capture the underlying concept of awareness. Opinion on media coverage uses people's opinion on how the media is spreading stories about global warming. As these questions all cover slightly different aspects, it is possible be that all or some of these questions do not measure awareness as the underlying construct.

When analyzing the results looking at different financial groups, it is found that the relationship between overall life satisfaction and sustainable behavior only holds when the monthly income is between €2501 and €4000. In addition, no evidence is found to support the relationship between overall life satisfaction and awareness in any group when the first measure for awareness is used. However, when using environmental worry as a proxy for awareness, it is found that more overall life satisfaction is associated with less awareness when income is between €500 and €1500. Furthermore,

for income between €1501 and €4000, a positive association between the first measure for awareness and sustainable behavior is found. All in all, the answer to the research question is not changed when looking at the results for different financial groups but it does suggest that income is of importance. It shows that the positive association between overall life satisfaction and sustainable behavior only holds for people with a relatively high income, but not for people with an income higher than €4000. Showing that only when income is high enough, e.g. when people have the resources to behave sustainable, awareness leads to more sustainable behavior. The insignificance of the results for the group with income higher than €4000 could be caused by the low number of observations.

When analyzing the results looking at different age groups, it is found that the positive association between overall life satisfaction and sustainable behavior only holds when people are 45 years old or older. This is in line with the previous finding that the association only holds for people with a high income, since older people usually have a higher income than younger people. Furthermore, no evidence is found to support the relationship between overall life satisfaction and the first measure for awareness in any group. For people between 34 and 54 years old, a positive association between the first measure for awareness and sustainable behavior is found. All in all, the answer to the research question is not changed when looking at the results for different age groups. The results only show that the positive association between life satisfaction and sustainable behavior holds for older people, which might be explained by a difference in resources to behave sustainably between older and younger people.

Overall, this research paper contributes to the understanding of the interrelation of life satisfaction and sustainable behavior. Life satisfaction is a concept that is broadly discussed in previous research. However, not much is known about the relationship between overall life satisfaction and sustainable behavior. The finding that awareness, as it is measured in this analysis, is probably not the mediating variable in this relation contributes to the understanding of life satisfaction and sustainable behavior and makes it possible to further narrow down what are the real mediating variables. Finding the real mediating variables could contribute to the understanding of sustainable decision making.

5.2 Limitations

To measure awareness, a single question is used. As no significant results were found, two other questions were also used to find out if there still were no significant results. Different results were found when using environmental worry as a proxy for awareness. Therefore, it remains questionable if the different questions all measure the same underlying concept; awareness. It could be that the different concepts that the questions cover, are measuring different things, e.g. worrying instead of

awareness. Furthermore, only a few respondents were in the group of low awareness for the first measure of awareness. This could have caused biased results as the group is relatively small.

In addition, the analyses were done using separate groups for age and financial situation. These additional analyses did not change the answer to the research question but showed for which groups the association holds. The insignificance of the results in some groups might be due to the low number of observations in some groups. For example, the second age group had less observations than the other groups, possibly leading to a low power of the statistical analyses. This was probably due to the fact that 50% of the respondents were older than 55 years, causing less respondents for the younger groups. To gain better insights into the effect of different groups, more (young) respondents are needed to give every groups enough respondents.

A further limitation is that this dataset is not panel data, therefore the relationships found are an association rather than a causal relationship. Using control variables is the first step to obtain causality, as you control for other factors that can influence the relationship. The data is obtained at one moment in time and gives no insight into what life satisfaction today does for sustainable behavior tomorrow. To gain further insight into the relationship between happiness and sustainable behavior, panel data would be more appropriate. Another method to gain insight into causality is to do a controlled experiment, because it allows you to control for the (exogenous) circumstances and research only the effect of the condition that is changed. Another problem that occurs when not using panel data is reverse causality. It is found that overall life satisfaction is positively associated with sustainable behavior. However, this does not tell us anything about the direction of this relationship. Happy people might be more likely to behave in an environmentally friendly manner, or caring for the environment could make people happier. Panel data can reduce this problem of reverse causality, since it can be researched what life satisfaction today does for sustainable behavior tomorrow.

Finally, due to limited resources, not all possible control variables were taken into account. However, the predictive power of the analyses could have been improved by accounting for more control variables. For example, controlling for the willingness to pay for sustainable solutions would have allowed for further insights. Sustainable solutions are often expensive and a higher willingness to pay would lead to more sustainable behavior compared to lower willingness to pay. Furthermore, controlling for the amount of media exposure would have allowed for further insights. As significantly more media exposure is associated with more awareness (Lee et al., 2015). Controlling for this variable allows further insights into the effects of overall life satisfaction.

5.3 Future research

In order to gain more insight into the mechanisms that explain why overall life satisfaction is related to sustainable behavior, future research could focus on the role of worrying. This study revealed that overall life satisfaction is associated with less awareness when it was measured as worrying about the environment. Future research could compare the mediating role of worrying about the environment and worrying in general, in order to learn more about these mechanisms. In addition, future research could use a more adequate measure for awareness. As discussed, it could be the case that the single question for awareness does not cover the concept of awareness. A measurement for awareness consisting of several questions could be a more reliable measure, as it is better able to cover the concept of awareness. This more advanced measure could change the results found. In addition, having a measure for awareness with the same number of respondents in the different groups could give more reliable results.

As this research showed that this measure for awareness is not the mediating variable, this raises the question what the mediating variable could be. The relationship between life satisfaction and sustainable behavior could be tested using a different mediating variable. For example, the time discounting rate of people could mediate the effect of happiness on sustainable behavior. This is because people who are more aware of the future, e.g. people with a lower discount rate, will behave more sustainable in order to not harm the planet.

Lastly, to find a causal relationship between life satisfaction and awareness, future research could use panel data or conduct an experiment to establish the causality in the relation.

Section 6. Conclusion

This research examines whether there is a relationship between overall life satisfaction and sustainable behavior and whether this relationship is mediated by awareness. The hypothesis is that overall life satisfaction is positively associated with more sustainable behavior, because happy people pay more attention to negative information and thus become more aware of environmental issues. To test these hypotheses, the data from the Hopebarometer 2018 are used. Evidence is found to support the relationship between overall life satisfaction and sustainable behavior. However, the results indicate that there is not enough evidence to support the relationship between overall life satisfaction and awareness. Using different operationalizations of awareness leads to the finding that worrying about the environment still does not play a mediating role in the relationship between overall life satisfaction and sustainable behavior

Furthermore, the evidence found to support the relationship between awareness and sustainable behavior is only found for the highest financial groups (€1501 and higher) and for people between 35 and 64 years old. In addition, using the proxies for awareness gives results that do support the relationship between awareness and sustainable behavior. Taking all the results together, no evidence for a mediating effect of awareness on the relationship between overall life satisfaction and sustainable behavior is found. All in all, this research does not find evidence to support a mediating effect of awareness on the relationship between overall life satisfaction and sustainable behavior. It only finds evidence to support the relationship between overall life satisfaction and sustainable behavior, and evidence that supports the relationship between awareness and sustainable behavior for people older between 35 and 64 years who earn more than €1501 each month.

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Appendix

Appendix 1: Measurements

In this appendix, an overview of the questions that are used from the Hopebarometer 2018 are given. In addition, also the recoding of the values of the answers are described.

Happiness

For the measurement of Happiness, Q13 from the Hopebarometer 2018 is used. The question is as follows:

"Taking everything together, how satisfied are you with your life as a whole?
1 1 Very dissatisfied
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
10 10 Very satisfied."

Awareness of climate change

For the measurement of awareness of climate change, 1 question from the Hopebarometer 2018 is used, namely; Q29. The original question and answers are as follows:

"Q29: Which of the following statements is, according to you, the most correct?
1 Most scientists think the earth is warming up
2 Most scientist don't think the earth is warming up
3 Most scientists are not sure if the earth is warming up
4 No opinion"

For this research, the answers to the question are given different values in such a way that all answers will indicate that a higher value is a higher degree of awareness. The last option "no opinion" has been giving a value of missing. The other options have changed the order to make sure a higher value indicates a higher degree of awareness. It looks as follows;

"Q29: Which of the following statements is, according to you, the most correct?
***3** Most scientists think the earth is warming up*
***1** Most scientist don't think the earth is warming up*
***2** Most scientists are not sure if the earth is warming up*
***.** No opinion"*

With option 1 considered as low awareness, option 2 considered as medium awareness and option 3 considered as high awareness.

Using multiple questions to measure awareness results in a low alpha due to the low correlations. As can be seen in the table below.

Table 1. Correlations awareness

	Start (Q27)	Exaggeration (Q28)	Scientists (Q29)	Cause (Q30)
Start (Q27)	1			
Exaggeration (Q28)	0,3410*	1		
	(0,00)			
Scientists (Q29)	0,3404*	0,2674*	1	
	(0,00)	(0,00)		
Cause (Q30)	0,3183*	0,3492*	0,2813*	1
	(0,00)	(0,00)	(0,00)	

Note: * indicates significance at 1% level and p-value in brackets.

Sustainable behavior

To measure sustainable behavior, questions about participation in sustainable activities are used. Four questions from the Hopebarometer 2018 are used, namely: Q45_1, Q45_2, Q45_3 and Q45_4. The values of the answers are not changed. The questions are:

"In the past year have you ...
Q45_1 not used certain products because they are bad for the environment?
Q45_2 tried to use less water?
Q45_3 recycled materials such as paper, glass, plastic?
Q45_4 used sustainable energy?
***1** Never*
2
3
4
5
6
***7** Always".*

Control measures

For the control measures, 4 questions from the Hopebarometer 2018 are used, namely: “geslacht”, “leeftijd”, “nettoink” and “oplmet”. The questions are as follows:

“Gender:
1 Men
2 Women”
“Age:
open question”

“Net income: net income per month in euros
open question
-13 I don’t know
-14 I don’t want to say
-15 missing”

“education: Highest education with diploma
1 primary education
2 VMBO
3 havo / vwo
4 MBO
5 HBO
6 University.
7 different
8 No education (yet) completed
9 Does not yet receive education”

The questions gender, net income and, education are changed. For net income, “I don’t know”, “I don’t want to say” and “missing” are changed to missing values. For gender, 1 represents males and 0 represents females. Lastly, for the question about education, the values are recoded so that a higher value indicates a higher education. The option “different” is changed to a missing value. The questions look as follows:

“Gender:
1 Men
0 Women”

“Net income: net income per month in euros
open question
. I don’t know
. I don’t want to say
. missing”

“education: Highest education with diploma
1 Does not yet receive education
2 No education (yet) completed
3 primary education
4 VMBO
5 havo / vwo
6 MBO
7 HBO
8 University
. different”

Appendix 2: Analyses using eudaimonic happiness

As a robustness check, the analyses are also done using a different measure for happiness. In the previous analyses, life satisfaction is used as a measure for happiness. This is a hedonic measurement for happiness. In this robustness check, eudaimonic happiness will be used, using the flourishing scale (Diener et al., 2010). The measurement for this scale consists of the following 8 questions:

"Indicate to what extent you agree with the following statements:
Q15_1 I am leading a meaningful life.
Q15_2 My social contacts are supportive and rewarding.
Q15_3 I am involved and interested in my daily activities.
Q15_4 I actively contribute to the happiness of others.
Q15_5 I am good at the activities that are important to me.
Q15_6 I am a good person and live a good life.
Q15_7 I am optimistic about my future.
Q15_8 Others respect me.
***1** Disagree entirely*
2
3
4
5
6
***7** Totally agree"*

The Cronbach's alpha for these questions is equal to 0.9241. Indicating that the internal consistency is excellent (Gliem and Gliem, 2003).

In order to answer the first hypothesis using the robustness check, eudaimonic happiness is regressed on sustainable behavior. The output of this OLS regression is shown in table 2 below in the first model. The coefficient for eudaimonic happiness is approximately 0.03, suggesting that an increase in the level of eudaimonic happiness with 1 point goes together with an increase in the level of sustainable behavior with 0.03 points. This coefficient is significant at the 1% level. This coefficient is lower compared to the analysis using life satisfaction. However, both coefficients are positive and the difference is small. Therefore, it can be suggested that the same effect is found.

In order to answer the second hypothesis using the robustness check, eudaimonic happiness is regressed on awareness of climate change. The output as marginal effects on this ordered logit regression is shown in Table 3 below. The coefficient for eudaimonic happiness is not significant. Therefore, it can be suggested that no effect from eudaimonic happiness on awareness of climate change is found. This same result is found when using life satisfaction as happiness.

In order to answer the third hypothesis, awareness of climate change is regressed on sustainable behavior. The output of this OLS regression is shown in Table 2 below in the second model. Nothing has changed compared to the earlier analysis, as happiness does not play a part in this regression. As can be seen, the coefficients for awareness of climate change are not significant. Therefore, it cannot be concluded that there is a positive or negative effect of awareness of climate change on sustainable behavior.

From the previous results, it is found that there is a positive association between eudaimonic happiness and sustainable behavior (table 2 model 1). In addition, table 3 shows that there is no association between happiness and awareness of climate change. Lastly, table 2 model 2 shows that there is no association between awareness of climate change and sustainable behavior. Therefore, it is not possible that there is a mediating effect of awareness of climate change on the relationship between eudaimonic happiness and sustainable behavior. These results are also found in the analysis using overall life satisfaction.

Table 2. Regressions using the flourishing scale

	(1)	(2)	(3)
	Sustainable behavior	Sustainable behavior	Sustainable behavior
Eudaimonic happiness	0.0302***		0.0273***
	(0.00732)		(0.00729)
Awareness Low awareness		(base category)	(base category)
Medium awareness		-0.197	-0.162
		(0.645)	(0.757)
High awareness		0.495	0.524
		(0.628)	(0.743)
Observations	618	554	554
R-squared	0.105	0.105	0.128

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, income and gender.

Table 3. Marginal effects of ordered logit regression

	(1)
	Awareness of climate change
Eudaimonic happiness	
Low Awareness	0.00001
	(0.0002)
Medium Awareness	0.0001
	(0.0019)
High Awareness	-0.00016
	(0.0020)
Observations	559
Pseudo R-squared	0.0244

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, income and gender.

Appendix 3: Additional analysis different measurement

For the extra analyses, question 25 (environmental worry) and question 28 (opinion on media coverage) are used. The questions and original answers are as follows:

"Q25: Are you worried about climate change or global warming?
1 Highly worried
2 Fairly worried
3 A little worried
4 No worries at all
5 No opinion"

"Q28: When you think about what is said in the news, do you think the problem of global warming is exaggerated, described in the right way, or underestimated?
1 Overall, it is exaggerated
2 Overall, it is described in the right way
3 Overall, it is underestimated
4 No opinion"

The answers of question 25 are recoded in such a way that a higher value indicates a higher degree of awareness of climate change and in addition that it is measured on a three-point scale. This is because the first question for awareness was also measured on a three-point scale. As before, no opinion is recoded into a missing value. The questions and answers do now look as follows:

"Q25: Are you worried about climate change or global warming?
1 No worries at all
2 A little worried
2 Fairly worried
3 Highly worried
. No opinion"

"Q28: When you think about what is said in the news, do you think the problem of global warming is exaggerated, described in the right way, or underestimated?
1 Overall, it is exaggerated
2 Overall, it is described in the right way
3 Overall, it is underestimated
. No opinion"

The frequencies of the answers given can be found in the tables below. As can be seen for both questions, the people that gave the middle answer has the highest frequency. However, the frequency per category is high enough to perform the analyses.

Table 4. Descriptives about environmental worry

	Frequency	Percentage
No worries at all	100	11,76%
A little worried	665	78,24%
Very worried	85	10,00%

Table 5. Descriptives about opinion on media coverage

	Frequency	Percentage
Overall, it is exaggerated	128	16,02%
Overall, it is described in the right way	373	46,68%
Overall, it is underestimated	298	37,30%

Appendix 4: Results additional analyses financial groups using opinion on media coverage

The results for hypothesis 2 for the different financial groups when using opinion on media coverage as a proxy for awareness can be found in table 6. No significant coefficient of life satisfaction is found. These results are no different from the first analysis. Therefore, there is still no evidence in support of hypothesis 2.

Table 6. Marginal effects of ordered logit regression (opinion on media coverage)

Financial situation	(€500 to €1500)	(€1501 to €2500)	(€2501 to €4000)	(€4001 and more)
	Opinion on media coverage	Opinion on media coverage	Opinion on media coverage	Opinion on media coverage
Overall life satisfaction				
Low media coverage	-0.0110	0.0102	-0.0066	-0.0388
	(0.0196)	(0.0126)	(0.0260)	(0.0407)
Medium media coverage	-0.0095	0.0112	-0.0028	-0.0109
	(0.0181)	(0.0133)	(0.0112)	(0.0149)
High media coverage	0.0205	-0.0213	0.0094	0.0497
	(0.0375)	(0.0254)	(0.0372)	(0.0515)
Observations	75	89	120	70
Pseudo R-squared	0.1234	0.0117	0.0056	0.0326

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

The results for hypothesis 3 for the different financial groups when using opinion on media coverage as a proxy for awareness can be found in table 7. For the third group, being in the high category, compared to the low category, is associated with an increase in sustainable behavior with 1,152 points. This coefficient is significant at the 1% level. For the last group, being in the high category for awareness, compared to being in the low category, is associated with an increase in sustainable behavior with 0.608 points. This coefficient is significant at the 10% level. Therefore, the results of the last two income groups are in support of hypothesis 3. This indicates that awareness goes together with more sustainable behavior when income is higher than €2501.

Table 7. OLS regression on sustainable behavior (using opinion on media coverage)

Financial situation		(€500 to €1500)	(€1501 to €2500)	(€2501 to €4000)	(€4001 and more)
		Sustainable behavior	Sustainable behavior	Sustainable behavior	Sustainable behavior
Opinion on media coverage	Low	(base category)	(base category)	(base category)	(base category)
	Medium	0.289	0.715*	0.718**	0.338
		(0.382)	(0.428)	(0.287)	(0.387)
	High	0.475	0.718	1.152***	0.608*
		(0.415)	(0.438)	(0.296)	(0.364)
Observations		75	85	120	70
R-squared		0.198	0.195	0.180	0.215

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

Appendix 5: Results additional analyses age groups using media coverage

The results for hypothesis 2 for the different age groups when using opinion on media coverage as a proxy for awareness can be found in table 8. No significant coefficient of overall life satisfaction in any of the groups is found. These results are no different from the first analysis. Therefore, there is still no evidence in support of hypothesis 2.

Table 8. Marginal effects of ordered logit regression (using opinion on media coverage)

Age category	(15 to 34 years)	(35 to 44 years)	(45 to 64 years)	(65+ years)
	Media coverage	Media coverage	Media coverage	Media coverage
Overall life satisfaction				
Low media coverage	-0.0085	0.0245	0.0087	-0.0074
	(0.0161)	(0.0257)	(0.0138)	(0.0141)
Medium media coverage	-0.0096	0.0417	0.0049	-0.0027
	(0.0187)	(0.0389)	(0.0079)	(0.0055)
High media coverage	0.0181	-0.0662	-0.0136	0.0101
	(0.0345)	(0.0615)	(0.0216)	(0.0195)
Observations	85	54	220	202
Pseudo R-squared	0.0544	0.0580	0.0314	0.0227

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.

The results for hypothesis 3 for the different age groups when using opinion on media coverage as a proxy for awareness can be found in table 9. Awareness only has a significant coefficient in the group 45 to 64 years old and 65+. For people between 45 and 64, being in the middle or high group goes together with more sustainable behavior compared to the low group. Medium awareness goes together with an increase in sustainable behavior of 0.526 points, compared to low awareness. High awareness goes together with an increase in sustainable behavior of 0.911 points compared to low awareness. The coefficients are significant at the %5 and 1% level, respectively. In addition, for people who are older than 65 years, high awareness goes together with an increase in sustainable behavior of 0.6819 points compared to low awareness. The other groups do not have any significant coefficients. Therefore, the results of the oldest group are in support of hypothesis 3, meaning that awareness of climate change goes together with more sustainable behavior for people older than 45.

Table 9. OLS regression on sustainable behavior (using opinion on media coverage)

Age category		(15 to 34 years)	(35 to 44 years)	(45 to 64 years)	(65+ years)
		Sustainable behavior	Sustainable behavior	Sustainable behavior	Sustainable behavior
Awareness	Low awareness	(base category)	(base category)	(base category)	(base category)
	Medium awareness	0.476	0.460	0.5263**	0.3436
		(0.539)	(0.558)	(0.2437)	(0.2367)
	High awareness	0.602	0.581	0.9110***	0.6819**
		(0.532)	(0.566)	(0.2401)	(0.238)
Observations		84	52	219	208
R-squared		0.039	0.055	0.1073	0.0938

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Note: model controls for age, age squared, income and gender.