



The effect of social comparison on environmental concern and how age moderates this effect

Abstract. Rapid climate changes and the aim to ensure a healthy and liveable environment for our future generation asks for the enhancement of people's sustainable behavior. Saving electricity is an important part of sustainable development nowadays. Enzler, Diekmann & Liebe (2019) found that environmental concern significantly predicts less electricity consumption. This highlights the importance of psychological factors in the development of sustainable behavior. The present research aims to investigate factors that influence environmental concern, specifically by testing if different degrees of social comparison influence environmental concern and if age moderates this relationship. Hardly any research has been done about the effect of social comparison on environmental concern, and the moderating effect of age. Relevant results could be an interesting addition to existing literature, since they might show an important influencing factor for environmental concern, and they may provide information about which age groups this applies to. This might be useful information for the development of sustainable behavior as well. Data of Enzler, Diekmann & Liebe (2019) is used in order to test the expected effects. 10.000 Swiss citizens were invited for their survey, 1392 people participated, which totals a response rate of 14 percent. Results of the analysis ($N = 1262$) show evidence that social comparison does have a positive effect on environmental concern. Besides, they show that the older people are, the less important the effect of social comparison seems to be for their environmental concern, which therefore supports the expected moderator effect. However, the average age of the respondents included in the dataset was high (64 years), which leads to the question whether this moderating effect holds for the whole range of age groups.

Keywords: Environmental concern, social comparison, age and sustainable behavior

15 June 2020

A.J. Oijevaar | 6292615

Bachelor thesis

Thesis supervisor: Philipp Schneider

Second reviewer: Sanjana Singh

University Utrecht | Faculty of Social Sciences Universiteit Utrecht | Sociology

Word count: 6098

Table of contents

1. Introduction 3

2. Theory 5

 2.1 Social comparison and environmental concern 5

 2.2 Age and social comparison..... 7

3. Methods 8

 3.1 Data 8

 3.2 Variables..... 9

 3.3 Analysis 11

4. Results 12

 4.1 Assumptions of the regression procedure..... 12

 4.1 Social comparison on environmental concern..... 13

 4.1 Social comparison, environmental concern and age 13

5. Conclusion..... 14

6. Discussion..... 15

References 18

1. Introduction

“If we do not change course by 2020, we risk missing the point where we can avoid runaway climate change, with disastrous consequences for people and all the natural systems that sustain us,” an urgent call from UN secretary-general António Guterres (United Nations Secretary-General, 2018). How to respond to climate change could be described as one of the greatest economic and environmental challenges of our century. The urgent and timeliness feature of this challenge makes it a high priority for both academics and policy makers. It requires cooperation between different disciplines, such as ecology, physics, psychology, sociology, political science and economics (Hornsey & Fielding, 2020). Ensuring a healthy and liveable environment for our future generation asks for the enhancement of people’s sustainable behavior (Penn, 2003). Therefore, it is important to research what motivates or predicts sustainable behavior.

One example of such research is the study of Enzler, Diekmann & Liebe (2019). They studied metered electricity consumption data among Swiss households in relation to the following psychological factors: future orientation and environmental concern. They found evidence that people’s environmental attitudes and future orientation correlate with energy consumption. They used metered electricity data in order to explain the relationship between these psychological factors and pro-environmental behavior. One conclusion they draw is that environmental concern significantly predicts less electricity consumption. Environmental concern can be defined as “the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or indicate a willingness to contribute personally to their solution” (Dunlap & Jones, 2002; p. 485). Environmental concern appears to have a significant contribution to the explanation of policy support for government regulations and market strategies that are aimed at managing environmental problems (Poortinga, Steg & Vlek, 2004).

As described before, we are dealing with a great aim to ensure a healthy and safe environment for our future generation, and this requires strong sustainable behavior of our current generation, which makes it important to investigate how sustainable behavior and its related factors such as environmental concern, can be motivated. One aspect Enzler, Diekmann & Liebe (2019) include in their survey, but is not included in their analysis, is the influence of social comparison. The Social Comparison Theory of Festinger (1954) states that it is people’s nature to compare themselves with others, which makes social comparison an important determinant for one’s attitudes and behavior. Evidence shows that everyone engages in the

process of social comparison from time to time, which is thought to have basic evolutionary benefits (Gibbons & Buunk, 1999). According to Gilbert, Price and Allan (1995), “the need to compare oneself with others is phylogenetically very old, biologically very powerful, and recognizable in many species” (Gilbert, Price & Allan, 1995; p. 149). However, Gibbons and Buunk (1999) believe that the extent to which people do compare varies for each individual. The development of sustainable behavior appears to be a process which is influenced by many social factors (Schouten, 2013). For example, it could be considered as a process of ‘Conditional Cooperation’, which is based on the idea “If others are willing to contribute to the public good, I am also willing to do that, but when others stop with their investments, I will stop as well” (Van Soest, 2017; p. 90). This supports the idea that people are comparing their own actions to others’, which plays a role in the development of sustainable behavior as well. Besides, individuals who are less self-focused seem more likely to develop a connection with nature, which predicts their pro-environmental attitudes in turn (Bragg, 1996; Mayer & Frantz, 2004).

As described, different theories point out that people comparing themselves to others might play a role in the development of sustainable behavior. However, hardly any research has been done about the actual effect of social comparison on environmental concern. Since Enzler, Diekmann & Liebe (2019) found that environmental concern is an important predictor for sustainable behavior, namely electricity use, it is interesting to investigate whether social comparison plays a role in this. Results following from this, can be a useful addition to existing literature.

As mentioned before, despite the fact that all people compare themselves to others to some extent, this degree differs per individual (Gibbons & Buunk, 1999). When it appears that social comparison might play an important role in the process of environmental concern, it is interesting to investigate if this relationship might be stronger for a particular group of people, such as different age groups. Gibbons & Buunk (1999) found a correlation between age and social comparison. The aim of the present research is to find out whether social comparison might be in relation to environmental concern, and to what extent age moderates the effect of social comparison on environmental concern. The research question of this research is:

What is the effect of the degree of social comparison on people’s environmental concern, and to what extent does age moderate this effect?

When this results in social comparison having a stronger effect on environmental concern for younger, or on the contrary, for older people, it might be interesting information for policy

aiming at sustainable behavior. Policy can be applied more targeted to certain age groups, in order to enlarge the success rate.

The present research aims at adding to the research of Enzler, Diekmann & Liebe (2019), for which their research data will be used. This thesis is structured as follows; first, a theoretical framework with existing literature will be described, from which hypotheses can be derived. Then in the method section the data and way of testing will be described, from which the results will be given in the results section. Finally a conclusion will be drawn, and some possible discussion points and ideas for further research will be described as well.

2. Theory

2.1 Social comparison and environmental concern

As described in the introduction, social comparison is an important determinant for one's attitudes and behavior. According to the Social Comparison Theory (Festinger, 1954), people have the need to compare their attitudes and characteristics with others, which follows from a desire to evaluate themselves: the so called *self-evaluation motive*. Since there is often no objective source available with which people can evaluate themselves, people evaluate themselves with other resembling people. This often happens fast and unconsciously (Frison & Eggermont, 2016). The extent to which people compare themselves to others, differs per individual. According to the 'self-determination theory', individuals who focus more on being self-distinguished in their actions, instead of comparing their actions to others, experience more freedom in doing what they think is interesting and important, and are less influenced by social comparison (Stapel & Blanton, 2006). Controversially, we would expect that people who focus less on being self-distinguished in their actions are more influenced by social comparison. They experience less freedom in doing what they think is interesting and important, and are more likely to follow others' actions and norms. Gibbons and Buunk (1999) developed a scale which measures individual differences in social comparison. The so called 'comparison orientation' is a personal character of people who are likely to compare themselves to others, who are interested in their position with respect to others and who like to know how others think and act in similar circumstances (Van der Zee, Oldersma, Buunk & Bos, 1998). Gibbons and Buunk (1999) concluded that a higher degree of comparison orientation correlates with different psychological factors, such as openness, depression and health uncertainty. This makes comparison orientation an important factor when analyzing one's behavior and traits, and might

therefore be important to take into account when looking at factors that influence environmental concern.

As argued by the self-determination theory, we can expect that people who focus less on being self-distinguished, are more likely to follow others' actions and norms. Social norms can serve as a way to influence behavior, by emphasizing the desired behavior as the norm (Reno, Cialdini & Kallgren, 1993). Two forms of norms can be distinguished; injunctive norms and descriptive norms (Schultz et al., 2007; Cialdini, Kallgren & Reno, 1991). Injunctive norms are norms about how one should behave, based on outspoken rules in society. It is about the perception of what is approved within the culture (Reno, Cialdini & Kallgren, 1993). Descriptive norms are more about what others do, they provide a standard where people do not want to deviate from, even if this behavior is desirable or not. People compare their own thoughts and behavior to these norms (Schultz et al., 2007). Nowadays, environmental problems and its norms that people create in order to resolve them are such pressing issues, that people tend to compare themselves to these norms. It appears that people's intention for certain behavior depends strongly from how, and to what extent, they compare themselves to descriptive and injunctive norms (Verwasch, 2019). For example, various researchers who studied the motivation for vaccination behavior, concluded that social norms influence the intention to vaccinate, which has an effect on the final vaccination behavior as well (Brunson, 2013; Gerend & Shepherd, 2012; Leask, Chapman, Hawe & Burgess, 2006). Behavior tends to follow from someone's intention to do something (Verwasch, 2019).

The extent to which people compare themselves to others appears to differ per individual. Especially people who focus less on being self-distinguished and who have a high comparison orientation, are influenced by others' actions and norms. Norms can influence people's intentions, which will influence their behavior as well. We expect social comparison to be important for environmental concern as well. The definition of environmental concern contains a willingness for personal contribution to a solution, by which 'willingness' can be considered as an intention (Dunlap & Jones, 2002; p. 485). Therefore, the expectation is that differences in social comparison will affect differences in the extent to which people are concerned about the environment. A higher degree of social comparison goes with a higher degree of being influenced in intentions and therefore with a higher degree of environmental concern. This leads to the following hypothesis:

H1: The more people compare themselves to others, the more concerned they will be about the environment.

2.2 Age and social comparison

As mentioned earlier in the introduction, Gibbons and Buunk (1999) believe that the extent to which people do compare themselves to others, varies for each individual. Comparison orientation is a personal character of people who are likely to compare themselves to others, who are interested in their position with respect to others and who like to know how others think and act in similar circumstances (Gibbons and Buunk, 1999; Van der Zee, Oldersma, Buunk & Bos, 1998). Various researchers suggest that some people are more likely to engage in social comparison processes than others (Gilbert, Price & Allan, 1995; Hemphill & Lehman, 1991; Steil & Hay, 1997; Taylor, Buunk, Collins & Reed, 1992). For example, individuals with a low self-esteem, who have a particularly unstable or uncertain self-concept, would be more likely to be interested in social comparison than individuals with a higher self-esteem. Several researchers concluded that the level of self-esteem differs by age category, and they found “gradual increases in self-esteem across adulthood”. For example, young adults have a lower self-esteem than middle-aged adults (Galambos, Barker, & Krahn, 2006; Gove, Ortega & Style, 1989; Jaquish & Ripple, 1981; Lall, Jain, & Johnson, 1996). Linking this to the comparison orientation scale of Gibbons and Buunk (1999), the expectation is that younger people are more likely to be engaged in social comparison processes than older people, since the self-esteem is lower for younger people than for older people.

Gibbons and Buunk (1999) studied different factors in combination to the ‘Comparison Orientation’ scale. They found a significant negative correlation between age and comparison orientation in a Dutch sample. This would mean that the older the people from this sample are, the lower they score on the comparison orientation scale. As follows, this indicates that older people are less likely to compare themselves to others, and are less interested in their position with respect to others than younger people (Van der Zee, Oldersma, Buunk & Bos, 1998).

Taking this together, we can say that the extent to which people do compare themselves to others, varies for each individual. Especially people with a low self-esteem are more likely to engage in social comparison processes. Research shows that the level of self-esteem differs per age, and young adults have a lower self-esteem than middle-aged adults (Galambos, Barker, & Krahn, 2006; Gove, Ortega & Style, 1989; Jaquish & Ripple, 1981; Lall, Jain, & Johnson, 1996). This indicates that younger people are more likely to be engaged in social comparison processes than older people. Besides, Gibbons and Buunk (1999) found a negative correlation between age and comparison orientation. Since we expected for hypothesis one that people who

are higher on social comparison score higher on environmental concern, we expect that age will be a negative moderator for this effect. The following hypothesis can be formulated:

H2: The older the people are, the less strong the effect will be of social comparison on their environmental concern.

3. Methods

For the present research, the effect of social comparison on environmental concern will be investigated, together with the moderating effect of age. Since the expectation is that age will weaken the effect of social comparison on environmental concern, age can be considered as a moderator variable. The effects stated in hypothesis 1 and 2 are visually explained in figure 1.

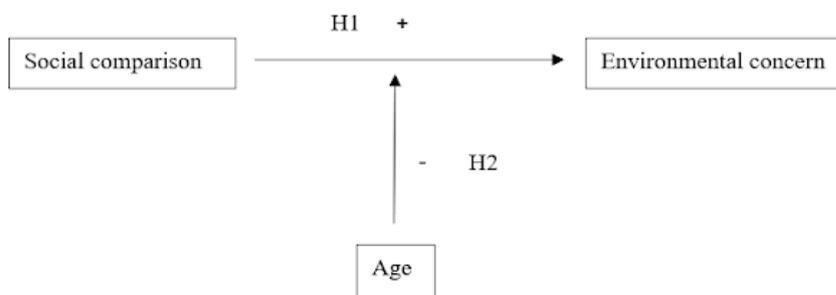


Figure 1: Expected effects

3.1 Data

The quantitative data set of Enzler, Diekmann & Liebe (2019) is used in order to measure the effects of hypothesis 1 and 2. The present researcher is very thankful for getting to use the dataset of Enzler, Diekmann & Liebe. Enzler, Diekmann & Liebe (2019) conducted a survey among citizens of Switzerland, which was in cooperation with a Swiss local energy supplier. The survey was conducted in 2016, for which an invitation letter with a link to an online questionnaire was sent to 10.000 customers of this energy supplier. In total, 1392 people participated in the survey, which gives a response rate of approximately 14 percent. ETH Zurich and the University of Bern announced this study as a scientific study in the theme of energy use among Swiss households. Enzler, Diekmann & Liebe ensured the anonymity of their research to their participants, and they did not include any sensitive questions in their questionnaire. The households' electricity consumption data of the previous year, provided by the energy supplier,

was then linked to the survey data. This completely anonymised combined data could be used for the analysis. In order to avoid possible bias, the respondents were not informed about the data linkage of their electricity use to their survey answers. Besides, the researchers never knew the identities of their respondents. Also for the present research, the data will be treated carefully and confidentially.

3.2 Variables

For this research, answers on questions that measure the degree of environmental concern, the degree of social comparison, and the respondent's age, will be used. For the dependent variable 'environmental concern', a total of nine statements in the survey will be used. All statements can be found in table 1. Respondents could answer on a 6-point scale ('Totally disagree', 'Tend to disagree', 'Agree partly', 'Tend to agree', 'Totally agree' or 'Don't know'). A Cronbach's alpha analysis showed a good consistency between all the nine scale items ($\alpha = .866$). Cronbach's alpha describes the reliability of different scale items, for which 0.7 indicates an acceptable reliability coefficient (Nunnally, 1978; Santos, 1999). All the nine items are combined into one variable, which determines the total degree of the respondents' environmental concern. For these items related to environmental concern, only the cases in which respondents filled in an answer on every item are counted. Before this is possible, the sixth item will be reversed in its values ('In my opinion, many environmentalists exaggerate claims about environmental threats'), what makes all the items measure in the same direction. The final variable 'Environmental concern' can be considered as a continuous variable. Descriptive statistics of this variable are described in Table 2. On average, respondents score relatively high on environmental concern (min. = 10; max. = 45; mean = 34.619), which means that the respondents of this sample are on average quite concerned about the environment.

In order to measure the degree of social comparison, the independent variable of this research, the answers on a total of six statements will be used. All statements can be found in table 1. Respondents could answer on a 5-point scale ('Totally disagree', 'Tend to disagree', 'Agree partly', 'Tend to agree' or 'Totally agree'). A Cronbach's Alpha analysis showed a good consistency between all the six scale items ($\alpha = .754$). Again, according to Nunnally (1978), scores of 0.7 and higher are acceptable reliability coefficients, which also applies to this coefficient of .754. All the six items are combined into the variable 'Social comparison', which determines the extent to which the respondents compare themselves to others. As with the items related to environmental concern, only the cases in which respondents filled in an answer on

every item will be count. Item three will be reversed in its values ('I am not the type of person who often compares himself to others'), what makes all the items measure in the same direction. Descriptive statistics of this continuous variable are described in Table 2, where it can be seen that respondents score relatively average on social comparison (min. = 6; max. = 30, mean = 17.083). This indicates that the respondents of this sample do not particularly compare themselves with others. Besides, it can be seen that respondents are on average 64 years old.

Table 1. Item wording for Environmental Concern, Social Comparison and age

	Item text
Environmental concern	<p>It bothers me when I think about the environmental conditions in which our children and grandchildren will probably have to live.</p> <p>If we continue down the same path, we are heading toward an environmental catastrophe.</p> <p>If I read news or watch TV news reports about environmental problems, I often become outraged and angry.</p> <p>There are limits on growth that our industrialized world has already exceeded or will soon reach.</p> <p>Most people in this country still do not act in an environmentally conscious way.</p> <p>In my opinion, many environmentalists exaggerate claims about environmental threats.</p> <p>Politicians still do not do enough to protect the environment.</p> <p>In order to protect the environment, we should all be willing to reduce our current standard of living.</p> <p>Actions to protect the environment should be implemented even if they cause job losses.</p>
Social comparison	<p>I always pay close attention to how I do things compared to others.</p> <p>I often compare my social skills and popularity to that of other people.</p> <p>I am not the type of person who often compares himself to others.</p> <p>I often try to find out what others think who are facing similar problems like me.</p> <p>I always want to know how others would behave in a similar situation.</p> <p>If I want to find out more about something, I try to find out what others think or know about that.</p>
Age	What is your date of birth?

Table 2. Descriptive statistics of the dependent, independent and control variables.

	Min.	Max.	Mean	sd.	N
Environmental Concern	10	45	34.619	6.596	1311
Social comparison	6	30	17.083	4.075	1379
Age	21	96	64.43	16.238	1393

3.3 Analysis

First, by using a simple regression analysis, we will test the extent to which social comparison can predict environmental concern. It creates the ability to see whether the degree of environmental concern increases or decreases when the degree of social comparison will increase. Second, a multiple regression analysis will be used in order to test whether age has an influence on the effect of social comparison on environmental concern. Therefore, an interaction term of social comparison and age will be added, in order to test whether the effect of social comparison on environmental concern differs when it interacts with age. By using this, it can be seen if age is a moderator for the effect of social comparison on environmental concern. All the three variables will be reduced to an equal N , so that the same sample sizes will be used for the analyses. In total, this will be an N of 1262. This is the amount of cases in which respondents filled in all answers on the questions belonging to the variables social comparison, environmental concern and age. All cases who did not fill in an answer on every item are filtered out. The outcomes of the analyses will be discussed in the ‘results’ section.

According to Allan, Bennett & Heritage (2014), before running and interpreting a regression analysis, four assumptions should be considered. First, all continuous variables that are included in the analysis should be approximately normally distributed, and second, univariate and multivariate outliers should be detected. Univariate outliers will be detected graphically with boxplots. Multivariate outliers are cases in which combinations of values across predictor variables are unusual, and will be detected with a Mahalanobis distance analysis. Third, multicollinearity between predictor variables should be detected, since it can complicate the interpretation of the regression analysis. They will be detected with the Tolerance and VIF. Fourth, the normality, linearity and homoscedasticity of residuals should be considered, for which a Scatter Plot and a Normal P-P Plot of Regression Standardized Residuals will be used (Allan, Bennett & Heritage, 2014). The results of the consideration of these four assumptions will be discussed in the ‘results’ section as well.

4. Results

4.1 Assumptions of the regression procedure

As described in the previous section, four assumptions should be considered before running and interpreting a regression analysis (Allen, Bennett & Heritage, 2014). First, a stem-and-leaf plot for the variables environmental concern, social comparison and age shows that all three variables are approximately normally distributed. It should be mentioned that the variable age is a little right-skewed, which is in line with the relatively high average age of the respondents that is reported earlier, namely 64 years. Besides, boxplots are retrieved and show that 16 extreme cases for environmental concern and 3 extreme cases for social comparison are detected. For environmental concern, these respondents scored very low on environmental concern. For social comparison, these respondents scored very high on social comparison. These cases have been checked in the dataset, and are not data entry errors and still part of the population. Besides, their values are part of the phenomena that is studied (Ader & Mellenbergh, 2004). Therefore, it is still relevant to include these cases in the analysis since it is useful information, so it was decided not to delete these extreme cases. For the variable age, no univariate outliers are detected. Second, a Mahalanobis Distance of 10.773 for the predictive variables social comparison and age is calculated, which is not higher than the critical chi-square value for $df = 2$ at $\alpha = .001$ (13.816). This indicates the absence of multivariate outliers. Third, a Tolerance of .916 for the predictive variables social comparison and age is calculated, which is not smaller than the critical value of 0.1, which means that there is no multicollinearity between those predictive variables. Besides, a VIF of 1.092 for these predictive variables is calculated, which does not exceeds the critical value of 10. This also indicates that there is no multicollinearity between the predictive variables. Finally, a Normal P-P Plot of Regression Standardized Residuals and a Scatterplot are retrieved. The first one shows that the residuals are normally distributed, since all the points cluster reasonably tightly along the diagonal line that is presented. The Scatterplot shows the presence of linearity and homoscedasticity (Allan, Bennett and Heritage, 2014).

The results of the regression analysis will be described in the following paragraphs which are presented in table 3. Table 3 shows model 1, a simple regression analysis with the variables social comparison and environmental concern can be seen which therefor tests hypothesis 1. Second, table 3 shows model 2, a multiple regression analysis can be seen with the variables social comparison, environmental concern and age. Additionally, table 3 shows

model 3, a multiple regression analysis including an interaction term can be seen with the variables social comparison, environmental concern, age and social comparison on age, which tests hypothesis 2.

4.1 Social comparison on environmental concern

In order to test the expected positive effect of social comparison on environmental concern, which is stated under hypothesis 1, a simple regression analysis has been done. The results of this analysis can be found in table 3, model 1. It shows that social comparison has a positive significant effect on environmental concern ($\beta = .240$; $t = 5.274$; $p < .001/2$). The original p -value of .000 needs to be divided by two, since the hypothesis tested is one-sided, which totals a $p < .001$. It can be concluded that there is support for hypothesis 1. A one-unit increase of social comparison on the used scale indicates an increase of the respondent's concern about the environment. Though, the calculation of Cohen's f^2 shows that this is a small effect ($f^2 = .022$) (Allan, Bennett & Heritage, 2014). Specifically, the results point out that the more people compare themselves to others, the more concerned they will be about the environment. However, this effect is relatively small.

4.1 Social comparison, environmental concern and age

First, a multiple regression analysis with social comparison, environmental concern and age is done, from which the results can be found in table 3, model 2. It shows that, controlling for age, social comparison still has a positive significant effect on environmental concern ($\beta = .191$; $t = 4.040$; $p < .001$). In order to say something about the expected moderating effect of age, stated under hypothesis 2, an interaction term of social comparison on age is added to the model, from which the results can be found in table 3, model 3. It shows that the interaction term has a significant negative effect ($\beta = -.005$; $t = -1.917$; $p = .055/2$). The original p -value of .055 needs to be divided by two since the hypothesis tested is one-sided, which totals a p -value of .028 and thereby makes the result significant. This indicates that the effect of social comparison on environmental concern varies by age. A one-unit increase of age on the used scale indicates a decrease of the effect of social comparison on environmental concern. Since we expected for hypothesis 2 that the older the people are, the less strong the effect will be of social comparison on their environmental concern, there is support for hypothesis 2 as well. Though, it should be mentioned that this effect is relatively small, which is indicated by the calculation of Cohen's f^2 ($f^2 = .035$) (Allan, Bennett & Heritage, 2014).

Table 3. Results of simple and multiple regression analysis for environmental concern ($N = 1262$)

	Variable	[95% CI]	β	S.E	t	Sig.
Model 1	Environmental concern (constant)	[29.009, 32.130]	30.570***	.795	38.431	.000
	Social comparison	[.151, .329]	.240***	.045	5.274	.000
Model 2	Environmental concern (constant)	[26.772, 30.532]	28.652***	.958	29.897	.000
	Social comparison	[.098, .284]	.191***	.047	4.040	.000
	Age	[.019, .066]	.043***	.012	3.552	.000
Model 3	Environmental concern (constant)	[16.328, 29.073]	22.701***	3.248	6.989	.000
	Social comparison	[.171, .913]	.542***	.189	2.867	.0004/2
	Age	[.038, .235]	.136**	.050	2.714	.007/2
	Social comparison*Age	[-.011, .000]	-.005*	.003	-1.917	.055/2

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

5. Conclusion

The present research was aimed at answering the research question: *What is the effect of the degree of social comparison on people's environmental concern, and to what extent does age moderate this effect?* Enzler, Diekmann & Liebe (2019) found that environmental concern is negatively related to electricity use. Since this concern appears to be an important factor to stimulate sustainable behavior, the present research tried to elaborate on social comparison as a predictor for environmental concern. Survey data from Enzler, Diekmann & Liebe (2019), conducted among Swiss households, was used for this research. Various regression- and interaction analysis were done in order to test this effect and its two hypotheses. The first hypothesis predicted that the more people compare themselves to others, the more concerned they will be about the environment. The second hypothesis predicted that the older the people are, the less strong the effect will be of social comparison on their environmental concern.

First, a positive effect of social comparison on environmental concern is found; it can be concluded that the more people compare themselves to others, the more concerned they will be about the environment. The effect was relatively small, but significant, which makes it an interesting addition to existing literature. The so called *self-evaluation motive*, suggested by Festinger (1954), causes a need for people to compare themselves with others. People compare their own thoughts and behavior to behavior and norms of others (Schultz et al., 2007), and are therefore influenced in their intentions and (sustainable) behavior (Verwasch, 2019). The *self-*

evaluation motive seems to be an important factor for the development of feelings of environmental concern. The findings of the present research indicate this, because they show that people who compare themselves more to other people, and therefore seem to have a stronger *self-evaluation motive*, are more concerned about the environment than people who compare less with others.

Second, it can be concluded that the higher someone's age, the less strong the effect will be of social comparison on the extent to which they are concerned about the environment. In other words; for older people, the degree to which they compare themselves to others seems to be a less important factor for their environmental concern than for younger people. The results show evidence that age negatively moderates the effect of social comparison on environmental concern. However, the effect found was relatively small. The result is in line with the conclusion of previous research that suggest that some people are more likely to engage in social comparison processes than others (Gilbert, Price & Allan, 1995; Hemphill & Lehman, 1991; Steil & Hay, 1997; Taylor, Buunk, Collins & Reed, 1992). In this case the differences in age appear to be a factor influencing the extent to which social comparison affects environmental concern. Also, this corresponds with the conclusion of Gibbons and Buunk (1999), containing that age and comparison orientation were negative correlated.

Results from existing literature indicate that social comparison appears to be an important factor for the realisation of certain behavior and intentions, and the extent to which people compare themselves to others differs per individual. With the small effect sizes in mind, the current findings form a useful addition to this field, since they show that social comparison is important in the realisation of environmental concern, and that this varies by age. It is a step further in the exploration of sustainable behavior and its related factors such as environmental concern, and might contribute to the international aim to ensure a healthy and liveable environment for our future generation. The current findings highlight the importance of sociological and psychological research in the attempt of advocating for more sustainable behavior.

6. Discussion

As mentioned earlier, hardly any research has been done before about the actual effect of social comparison on environmental concern. The results of the present research can be considered as useful additions to existing literature, since they show that a social factor, social comparison in

this case, plays an important role for the extent to which someone is concerned about the environment. Besides, it shows evidence that age is an influencing factor for this effect. However, there should be some critical reflection on some aspects. As first, despite the support found for both hypotheses, it should be mentioned that these findings are supported by small effect sizes. Besides it is important to discuss the high average score of the respondents on the variable environmental concern. On the used scale, which ranged from 10 to 45, the mean score of the respondents was 34.6. This indicates that the respondents of this sample are on average quite concerned about the environment. It might have influenced the analysis of the effect of social comparison on environmental concern, and the moderating effect of age. Further research, in which respondents included in the sample score a little lower on environmental concern, might measure a more realistic and representative effect of social comparison on environmental concern. Besides, further research could focus more on other population groups than Swiss people, in order to see whether the effect applies to other countries or groups. This might therefore strengthen the effect and might support more representativeness.

Also, as mentioned previously the distribution of the variable age was a little right-skewed, which corresponds with the relative high age reported of 64 years. This might have influenced the results of the multiple regression analysis. Because the distribution of the variable age was right-skewed, and thus more concentrated around older ages such as 64 years, it could be that there was insufficient spreading in order to measure whether the effect of social comparison on environmental concern actually decreases as the age increases. Further research with a more normally distributed dataset of age could indicate whether the found effect of age weakening the effect of social comparison on environmental concern applies to other populations or other countries as well.

Furthermore, the response rate to the research of Enzler, Diekmann & Liebe (2019) was low, which leads to the question whether the results from this sample differ significantly from the general population and whether these results hold for other groups of the population. Also, the potential self-selection should be considered, since the sample that is taken differs from the population in terms of gender and age. The invitation letter for the survey went probably to the household head, who still tends to be older and male. Thereby, it is possible that mainly environmentally motivated households responded to the survey, which creates the potential self-selection bias (Enzler, Diekmann & Liebe, 2019). This information corresponds with the reported high average age and the high mean score of the respondents on the variable environmental concern.

Besides the ideas for further research regarding representativeness and more support for the results that were found, some additional research might elaborate on social comparison, environmental concern and age. To begin with further exploration to social comparison in the field of sustainable behavior. The questions used in this survey ask the respondent about social comparison in general, but no information is provided about whether they compare their own sustainable or unsustainable thoughts and behavior to others. It is interesting to find out whether this might affect someone's environmental concern. Also, further exploration to which specific comparison groups are important for people in the development of their environmental concern, could be a next step in research. As mentioned before, the questions used in this survey ask the respondent about social comparison in general, no information is provided about with whom they compare themselves. It might be that friends or classmates are important comparison groups for younger people in the theme of sustainability, where neighbours or family members are important for older people. According Festinger's (1954) Social Comparison Theory, people especially compare themselves to others with whom they share similar characteristics, such as age (Murray, Johnson, Luepker & Mittelmark, 1984), gender (White, Hogg & Terry, 2002) and personal attributes (Carli, Ganley, & Pierce-Otay, 1991). With this information, policy in the interdisciplinary field of sustainable development can respond with tailor-made advices. Tools and advices specified for certain groups in society might enlarge the societal acceptability of new policies regarding the process of the development of environmental concern (Hemerijck, 2003).

The findings of the present research already form useful information for policies, since they highlight the importance of the social comparison processes in the field of sustainable behavior, which can be used in the development of new measures or campaigns. Social comparison can be used as a tool in the process of making people more concerned about their environment, and therefore let them act more pro-environmentally. When people share their concerns about the environment more, for instance via social media, this might motivate others to get concerned about the environment as well. For example, it could emphasize the promotion of people demonstrating at climate marches who express their concerns about the environment. Other people who are faced to these concerns, might become concerned about the environment themselves as well. It is important to keep in mind that such a tool especially will be useful for younger people, who have a high comparison orientation.

References

- Ader, H., & Mellenbergh, D. (2004). Adviseren over onderzoeksmethoden: Ontbrekende waarnemingen, uitbijters en nonrespons.
- Allen, P., Bennett, K., & Heritage, B. (2014). *SPSS Statistics Version 22: a practical guide* (3rd ed.). South Melbourne, Australia: Cengage Learning Emea.
- Bragg, E. A. (1996). Towards ecological self: Deep ecology meets constructionist self-theory. *Journal of Environmental Psychology, 16*(2), 93–108.
<https://doi.org/10.1006/jevp.1996.0008>
- Brunson, E. K. (2013). The impact of social networks on parents' vaccination decisions. *Pediatrics, 131*(5). <https://doi.org/10.1542/peds.2012-2452>
- Carli, L. L., Ganley, R., & Pierce-Otay, A. (1991). Similarity and Satisfaction in Roommate Relationships. *Personality and Social Psychology Bulletin, 17*(4), 419–26. <https://doi.org/10.1177/0146167291174010>
- Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A Focus Theory of Normative Conduct: A Theoretical Refinement and Reevaluation of the Role of Norms in Human Behavior. *Advances in Experimental Social Psychology, 24*, 201–234.
[https://doi.org/10.1016/S0065-2601\(08\)60330-5](https://doi.org/10.1016/S0065-2601(08)60330-5)
- Dunlap, R. E., & Jones, R. E. (2002). Environmental concern: Conceptual and measurement issues. *Handbook of environmental sociology, 3*(6), 482–524.
- Enzler, H. B., Diekmann, A., & Liebe, U. (2019). Do environmental concern and future orientation predict metered household electricity use? *Journal of Environmental Psychology, 62*, 22–29. <https://doi.org/10.1016/j.jenvp.2019.02.004>
- Festinger, L. (1954). A Theory of Social Comparison Processes. *Human Relations, 7*(2), 117–140. <https://doi.org/10.1177/001872675400700202>
- Frison, E., & Eggermont, S. (2016). “Harder, Better, Faster, Stronger”: Negative Comparison on Facebook and Adolescents' Life Satisfaction Are Reciprocally Related. *Cyberpsychology, Behavior, and Social Networking, 19*(3), 158–164.
<https://doi.org/10.1089/cyber.2015.0296>
- Galambos, N. L., Barker, E. T., & Krahn, H. J. (2006). Depression, self-esteem, and anger in emerging adulthood: Seven-year trajectories. *Developmental Psychology, 42*(2), 350–365. <https://doi.org/10.1037/0012-1649.42.2.350>
- Gerend, M. A., & Shepherd, J. E. (2012). Predicting human papillomavirus vaccine uptake in young adult women: Comparing the health belief model and theory of planned

- behavior. *Annals of Behavioral Medicine*, 44(2), 171–180.
<https://doi.org/10.1007/s12160-012-9366-5>
- Gibbons, F. X., & Buunk, B. P. (1999). Individual differences in social comparison: Development of a scale of social comparison orientation. *Journal of Personality and Social Psychology*, 76(1), 129–142. <https://doi.org/10.1037/0022-3514.76.1.129>
- Gilbert, P., Price, J., & Allan, S. (1995). Social comparison, social attractiveness and evolution: How might they be related? *New Ideas in Psychology*, 13(2), 149–165.
[https://doi.org/10.1016/0732-118X\(95\)00002-X](https://doi.org/10.1016/0732-118X(95)00002-X)
- Gove, W. R., Ortega, S. T., & Style, C. B. (1989). The Maturational and Role Perspectives on Aging and Self Through the Adult Years: An Empirical Evaluation. *American Journal of Sociology*, 94(5), 1117–1145. <https://doi.org/10.1086/229113>
- Hemerijck, A. (2003). Vier kernvragen van beleid. *Beleid En Maatschappij*, 30(1), 3–19.
<https://doi.org/10.1347/benm.30.1.3.12199>
- Hemphill, K. J., & Lehman, D. R. (1991). Social Comparisons and Their Affective Consequences : the Importance of Comparison Dimension and Individual Difference Variables. *Journal of Social and Clinical Psychology*, 10(4), 372–394.
<https://doi.org/10.1521/jscp.1991.10.4.372>
- Hornsey, M. J., & Fielding, K. S. (2020). Understanding (and Reducing) Inaction on Climate Change. *Social Issues and Policy Review*, 14(1), 3–35.
<https://doi.org/10.1111/sipr.12058>
- Jaquish, G. A., & Ripple, R. E. (1981). Cognitive creative abilities and self-esteem across the adult life-span. *Human Development*, 24, 110 – 119. <https://doi.org/10.1159/000272654>
- Lall, R., Jain, V. K., & Johnson, W. B. (1996). Contemporary norms for the coopersmith self-esteem inventory-adult form. *Perceptual and Motor Skills*, 82(3), 1136–1138.
<https://doi.org/10.2466/pms.1996.82.3c.1136>
- Leask, J., Chapman, S., Hawe, P., & Burgess, M. (2006). What maintains parental support for vaccination when challenged by anti-vaccination messages? A qualitative study. *Vaccine*, 24(49–50), 7238–7245. <https://doi.org/10.1016/j.vaccine.2006.05.010>
- Mayer, F. S., & Frantz, C. M. P. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology*, 24(4), 503–515. <https://doi.org/10.1016/j.jenvp.2004.10.001>
- Murray, D. M., Johnson, C. A., Luepker, R. V., & Mittelmark, M. B. (1984). The Prevention of Cigarette Smoking in Children: A Comparison of Four Strategies. *Journal of*

- Applied Social Psychology*, 14(3), 274–288. <https://doi.org/10.1111/j.1559-1816.1984.tb02236.x>
- Nunnally, J. C. (1978). *Psychometric Theory* (2d ed.) New York, United States: McGraw-Hill.
- Penn, D. J. (2003). The evolutionary roots of our environmental problems: Toward a Darwinian ecology. *The quarterly review of biology*, 78(3), 275-301. <https://doi.org/10.1086/377051>
- Poortinga, W., Steg, L., & Vlek, C. (2004). Values, environmental concern, and environmental behavior: A study into household energy use. *Environment and Behavior*, 36(1), 70–93. <https://doi.org/10.1177/0013916503251466>
- Reno, R. R., Cialdini, R. B., & Kallgren, C. A. (1993). The Transsituational Influence of Social Norms. *Journal of Personality and Social Psychology*, 64(1), 104–112. <https://doi.org/10.1037/0022-3514.64.1.104>
- Santos, J. R. A. (1999). Cronbach's alpha: A tool for assessing the reliability of scales. *Journal of extension*, 37(2), 1-5.
- Schouten, M. (2013). *Duurzaamheid: een sociaal proces* (Master's thesis, University of Twente).
- Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Giskevicius, V. (2007). The Constructive, Destructive, and Reconstructive Power of Social Norms. *Psychological Science*, 18(5), 429–434. <https://doi.org/10.1177/1745691617693325>
- Stapel, D. A., & Blanton, H. (2006). *Social Comparison Theories* (1st ed.). Abingdon, United Kingdom: Psychology Press.
- Steil, J. M., & Hay, J. L. (1997). Social comparison in the workplace: A study of 60 dual-career couples. *Personality and Social Psychology Bulletin*, 23(4), 427-438. <https://doi.org/10.1177/0146167297234008>
- Taylor, S. E., Buunk, B. P., Collins, R. L. & Reed, G.M. (1992). Social Comparison and Affiliation Under Threat. In G. M. Reed (Ed.), *Life Crises and Experiences of Loss in Adulthood* (pp. 213–227). New Jersey, New York: Taylor & Francis Inc.
- United Nations Secretary-General. (2018, September 10). *Secretary-General's remarks on Climate Change [as delivered]*. Retrieved from <https://www.un.org/sg/en/content/sg/statement/2018-09-10/secretary-generals-remarks-climate-change-delivered>.
- Verwasch, S. E. A. (2019). *De relatie tussen identificatie en de intentie om voedselverspilling te verminderen* (Bachelor's thesis, Utrecht University).

- Van Der Zee, K., Oldersma, F., Buunk, B. P., & Bos, D. (1998). Social Comparison Preferences among Cancer Patients as Related to Neuroticism and Social Comparison Orientation. *Journal of Personality and Social Psychology*, 75(3), 801–810. <https://doi.org/10.1037/0022-3514.75.3.801>
- Van Soest, D. (2017). Milieu: Het verklaren en stimuleren van groen gedrag. In R. Dur (Ed.), *KVS Preadviezen 2017: Over Gedrageconomie en Economisch Beleid* (pp. 88-95). Koninklijke Vereniging voor de Staatshuishoudkunde. <https://esb.nu/kvs/20035098/milieu-het-verklaren-en-stimuleren-van-groen-gedrag>
- White, K. M., Hogg, M. A., & Terry, D. J. (2002). Attitude-behavior Correspondence Through Exposure to Normative Support From a Salient Ingroup. *Basic and Applied Social Psychology*, 24(2), 91-103. https://doi.org/10.1207/S15324834BASP2402_2