Finding Antecedents of Sustainable Food Consumption: The Individual Dispositions of Compassion for Others and Mindfulness

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Abstract

Purpose. A growing number of people follow a sustainable diet. To understand why some people act more sustainably than others, scholars started to focus on individual dispositions. Especially compassion and mindfulness show promising positive relationships with sustainable behaviour. Consequently, the purpose of this paper was to deepen the understanding of the relations between sustainable food consumption, compassion for others and mindfulness.

Method. A cross-sectional correlational research design was employed, and participants (n=118) represented a mainly German and Dutch student population. The variables of compassion for others, mindfulness and sustainable food consumption were measured using the Compassion Scale, the Five Facet Mindfulness Questionnaire Short Form and the Green Eating Behaviour scale. To test the hypotheses, mediation analyses were conducted with SPSS.

Results. Most participants considered themselves as sustainable food consumers. However, results showed that their level of sustainable food consumption was rather medium. No significant relation between compassion and sustainable food consumption could be found. However, the mindfulness facet 'observing' did have a significant effect on sustainable food consumption. A relationship between compassion and mindfulness could be observed.

Conclusion. This study examined the effect of compassion for others and mindfulness on sustainable food consumption. As results showed only small or no significant effects, future research could consider different mediating variables such as connectedness to nature, or compassion for the environment, which could possibly be more related to food consumption.

Finding Antecedents of Sustainable Food Consumption: The Individual Dispositions of Compassion for Others and Mindfulness

It is widely acknowledged that the consumption of food has a high environmental impact and contributes significantly to the climate crisis (van Dooren et al., 2018). According to the World Business Council for Sustainable Development, Europeans mostly choose food that is convenient, processed, contains animal-protein and can be consumed to-go (Cairns et al., 2018). But such food choices are unsustainable and account for approximately one third of all greenhouse gas emissions in Western countries (Hunecke & Richter, 2019; Tobler et al., 2011). Additional negative impacts on the environment are desertification, soil erosion, pesticides entering the ground, and water contamination (Notarnicola et al., 2012). However, a growing number of people in Europe engage in a new form of diet: a diet in which plant-based food, sustainability, and reduced animal-products are valued (Cairns et al., 2018).

When being presented with these two types of food consumption, questions arise about how these people differ from each other and why some of them act sustainably and others do not. To answer these questions, it is essential to investigate the role of individual, internal dispositions of human beings (Wamsler et al., 2017). These can include individual traits, emotions, thought patterns, world-views, as well as cognitive capacities such as mindfulness or empathy (Ives et al., 2020; Wamsler, 2019). According to several scholars, it is these individual dispositions that lie at the core of sustainability challenges and are thus indispensable for finding solutions to them (Horlings, 2015; Ives et al., 2020; Wamsler, 2019).

In fact, a gap exists in the scientific literature about how these individual dispositions affect and promote sustainable behaviour and, up to date, only a few scientists investigated their relation (Ives et al., 2020; Wamsler, 2019; Wamsler et al., 2017). So far, climate change mitigation actions solely included external approaches such as changing government dynamics or developing new technologies, but more holistic approaches are needed as the exclusive focus on external efforts is too little and does not result in sufficient sustainable change (Ives et al., 2020; Parodi & Tamm, 2018; Wamsler, 2019). Scholars hypothesize that learning about how individual dispositions influence sustainable behaviour can lead to finding solutions that, in the end, change human core values and ethical principles and therefore could result in broad behaviour change towards sustainability (Geiger et al., 2019). Consequently, this paper investigates two individual dispositions of human beings and their relation to sustainable food consumption.

Sustainable Food Consumption

Sustainable food consumption can generally be defined as a diet that has "low environmental impacts [,] which contribute[s] to food and nutrition security and to [a] healthy life for present and future generations" (Food and Agriculture Organization of the United Nations, 2010, p. 10). Scientists have different views on how exactly sustainable food consumption should be practised, but most agree on the following aspects: From a sustainability perspective, people should choose food that contains (1) little animal products and is (2) regionally, (3) seasonally and (4) organically grown (von Koerber et al., 2015). Additionally, researchers state that (5) fair-trade products should be chosen, and (6) if meat or poultry is consumed, free-range or cage-free meat and poultry products should be picked (Weller et al., 2014).

According to several scholars, these sustainable foods have various environmental benefits compared to conventional food products. (1) Choosing fewer animal-derived products significantly lowers the number of greenhouse gases being distributed into the atmosphere (Hunecke & Richter, 2019). (2) Regional products have the advantage of having short transport routes from the farmer to the consumer and (3) seasonal products further reduce CO_2 emissions as the products do not need to be heated by oil in tunnels or greenhouses but can grow outside without artificial heat (von Koerber et al., 2015). Furthermore, (4) organic food products have several advantages for the climate as well: First, fewer pesticides are used, thereby enhancing soil quality. Second, more biodiversity exists on organic farms, which leads to a reduced chance of soil erosion. In general, the greenhouse gas emissions of organic products are approximately 25% lower than those of conventional farm products (von Koerber et al., 2015). (5) Choosing Fairtrade products can also be considered sustainable as all Fairtrade-certified farmers are required to adhere to strict sustainable agricultural production regulations with regard to "pesticide use, water conservation, soil erosion, biodiversity, and energy use, [thereby] reducing the carbon footprint of agriculture" (Pyk & Hatab, 2018, p. 1551). Lastly, (6) free-range and cage-free systems can be seen as more sustainable than conventional keeping systems, as their eutrophication potential is lower (Kollenda et al., 2020). Eutrophication stands for an overrichment of nutrients in lakes and rivers, which has a negative impact on the environment (Smith, 2009). Furthermore, free-range and cage-free systems have a reduced output of emissions and can even enhance soil quality as the animals move the soil around while searching for food (Kollenda et al., 2020).

Individual Dispositions as Antecedents of Sustainable Behaviour

To enhance sustainable behaviours such as choosing sustainable food products, researchers only recently started to engage in new, more holistic, approaches. One of these new approaches is called personal sustainability (or individual sustainability), which represents the view that humans' individual dispositions have an influence on their behaviour and whether it is sustainable or not, and it is these individual dispositions that need further exploration in sustainability research (Parodi & Tamm, 2018). According to Pappas and Pappas (2015), the focus on these individual dispositions is essential because they create the foundation of human day-to-day actions which have a strong impact on sustainability. Before large societal changes towards sustainability can be expected, it is indispensable to achieve individual change towards it (Pappas et al., 2015). In line with this, Wamsler and Brink (2018) and Wamsler (2019) explain why the focus on individual dispositions could lead to a solution of sustainability challenges: It was found that certain individual dispositions lead to increased action tendencies, a clearer view of climate change and its consequences and a general other-focused-ness (Wamsler & Brink, 2018). These again lead to a reduction of fatal behaviour regarding climate change and support pro-environmental actions. Wamsler (2019) adds that the focus on individual dispositions is essential in climate change mitigation, as such dispositions can be enhanced through educational teaching approaches, for example in schools. This implies that sustainable behaviour could get promoted from a young age, thereby creating a broad behavioural change towards sustainability among the population.

However, the goal of reaching sustainability is greatly challenged by a lack of understanding of these individual dispositions and how exactly they influence sustainable behaviour (Pappas et al., 2015). To overcome this challenge, researchers recently started to study this relation. In this context, especially the dispositions of compassion for others and mindfulness gained attention and showed promising results regarding their impact on sustainability (Wamsler & Brink, 2018).

Compassion for Others

Compassion can be seen as an individual disposition, a general tendency of an individual to react with compassion when being confronted with others' suffering (Hou et al., 2017). The definition of compassion by Lazarus (as cited in Geiger & Keller, 2018) is the most commonly used definition in scientific papers and describes compassion as "the concrete feeling for the suffering of others" (p.1122). Relating to this, Geiger and Keller (2018) explained further that

compassion is “elicited when we see others suffer and is characterized by the wish to help and relieve the pain” (p.1122). Several scholars stated that compassion evokes pro-social action tendencies (Geiger & Keller, 2018; Pfattheicher et al., 2015). This means that compassionate individuals have the goal of relieving the suffering of others and actively follow this goal, putting thoughts into action (Pfattheicher et al., 2015). As a consequence, compassion has been associated with various prosocial actions such as volunteering, donating or helping vulnerable groups in general (Pfattheicher et al., 2015).

Geiger and Keller (2018) mentioned that feeling compassion for others can also increase sustainable behaviour. The study by Pfattheicher et al. (2015) showed similar results and actually demonstrated a positive causal relationship between compassion and sustainable behaviour. Pfattheicher et al. (2015) showed causality between compassion and sustainable behaviour through manipulating compassion in their study by showing emotional pictures of suffering human beings and giving their participants instructions on how to evaluate the picture. The authors explained that the relation between compassion for others and sustainable behaviour can be similarly explained like the aforementioned prosocial actions: Compassion elicits the want to prevent and relieve other’s suffering, which can simply be transferred to people suffering from natural and environmental disasters (Pfattheicher et al., 2015). Still, the authors did not exclude other possible pathways or processes and named possibilities such as a heightened awareness of negative developments for others, or moderating variables such as political orientations that might contribute to the effect that compassion has on sustainable behaviour (Pfattheicher et al., 2015). These moderating variables could possibly weaken or strengthen the expected relation between compassion and sustainable behaviour.

When it comes to sustainable food consumption in particular, it can be said that nearly nothing is known about its relationship with compassion for others. So far, only a few studies (e.g. Geiger & Keller, 2018; Pfattheicher et al., 2015) have been conducted that investigated the relationship between compassion for others and sustainable behaviour. These studies have solely focused on sustainable behaviour in general, and more specific behaviours such as food consumption have been largely ignored. However, it is essential to investigate more specific types of sustainable behaviour, as they can differ from each other regarding their consequences and antecedents. Geiger and Keller (2018) and Pfattheicher et al., (2015) recognized this as well and

mentioned that further studies are needed to deepen the understanding of compassion for others and sustainable behaviours and find possible mediating or moderating variables.

Mindfulness

Another individual disposition that gained attention with regard to sustainable behaviour is mindfulness. Mindfulness is characterized by a "deliberate, unbiased and openhearted awareness of perceptible experience in the present moment" (Fischer et al., 2017, p. 544). To explain it more simply, being mindful means being intentionally attentive to the present moment, without judging that moment (Wamsler & Brink, 2018). In this paper, mindfulness will be considered as a personality trait, meaning that individuals differ from each other on their level of mindfulness (Sala et al., 2019). According to Baer et al. (2008), mindfulness consists of five facets: The first facet is called 'observing' and refers to the noticing of internal and external experiences (e.g. emotions, sounds). The second facet of 'describing' stands for the labelling of internal experiences with words. Third, 'acting with awareness' is another facet that is composed of the momentary awareness of one's actions. The fourth facet is called 'nonjudging' and means that one tries to not evaluate feelings or thoughts. Lastly, the fifth facet 'nonreactivity' refers to the ability to let thoughts and feelings come and go, without holding onto them for too long (Baer et al., 2008). Several scholars tried to examine which of these facets have an effect on sustainable behaviour, but results about this differ from study to study, which is why, in this paper, all five facets of mindfulness will be tested (Richter & Hunecke, 2020).

Generally, mindfulness has five possible ways of positively influencing sustainable consumption behaviour. First, through heightened awareness, unsustainable routines get disrupted, which can possibly lead to a change towards more sustainable thinking patterns (Ericson et al., 2014; Geiger et al., 2019; Wamsler et al., 2017). Second, mindfulness can decrease the gap between people's intentions and actual behaviour as one is more aware of one's own actions. Third, mindfulness can lead to an increased connectedness to nature and others, which makes people act more responsibly and sustainably (Geiger et al., 2019). Fourth, evidence showed that mindfulness is related to socially-oriented values, which are positively correlated to sustainable behaviour (Geiger et al., 2019). Lastly, mindfulness is able to increase sustainable behaviour through its positive effect on health. Geiger et al. (2019) showed that being healthy and having good well-being are determinants of sustainability.

Indeed, although mindfulness is not a new concept in science, it has been largely neglected

in sustainable consumption research (Wamsler et al., 2017). Only a few studies have examined the relation between mindfulness and sustainable consumption. Many of these studies used a one-faceted measure of mindfulness, which is not ideal, as it has been proven that mindfulness is multifaceted (Geiger et al., 2019). Therefore, further research is needed about the individual facets of mindfulness and their specific relation to sustainable food consumption.

Relation between Compassion and Mindfulness

The relation between compassion for others and mindfulness has been studied in several domains: On the one hand, much literature states that being mindful increases compassionate behaviour: According to Neff and Dahm (2015), mindfulness is essential when wanting to be compassionate, as being mindful leads to a heightened awareness of the self and the surroundings, which facilitates the detection of the suffering of others. In another study, mindfulness was increased by meditation techniques and results showed that this kind of meditation increases compassionate behaviour (Lim et al., 2015). Fischer et al. (2017) also support that mindfulness increases compassion towards oneself and others, additionally stating that compassion might be a possible mediator between mindfulness and sustainable consumption. On the other hand, one study suggested that being compassionate can also increase the level of mindfulness a person experiences (Jazaieri et al., 2013). This study explained that the heightened awareness of the suffering of others, which is present in compassionate individuals, can modify mental states and can therefore lead to feeling more present in the moment and more engaged with others, which are attributes of mindfulness (Jazaieri et al., 2013). Jazaieri et al. (2013) therefore suspected that the relation between mindfulness and compassion is possibly reciprocal, meaning that both variables reinforce each other.

However, several limitations to these studies exist: First off, most of the studies examining the relationship between mindfulness and compassion have been limited to one specific type of compassion, namely self-compassion (Ko et al., 2018; Orosa-Duarte et al., 2021; Yip et al., 2017). According to Neff and Dahm (2015), self-compassion "is simply compassion directed inward, relating to ourselves as the object of care and concern when faced with the experience of suffering" (p.121). Compassion for others was often not considered in these studies and it would be interesting to see whether a relation between mindfulness and compassion for others also exists, as mindfulness, just as self-compassion, rather focuses on the self, whereas people who feel compassion for others rather show prosocial qualities and are less focused on the self (Roca et al.,

2021). Additionally, few studies examined the relation between compassion and mindfulness in a sustainability context (Wamsler et al., 2017). Often mindfulness-compassion studies were performed in the fields of health care, pedagogy and business- but not with regard to sustainability (Wamsler et al., 2017). Furthermore, many of the studies examining the relationship between compassion and mindfulness focused solely on momentary states of these variables and less on trait compassion and mindfulness (Best et al., 2020; Lim et al., 2015). However, it has been found that these variables also have trait-like qualities as people's propensity to be mindful or compassionate differs from one person to another, based on their general mental capacity to be mindful or compassionate (Sajjad & Shahbaz, 2020; Waring & Kelly, 2019). Therefore, this paper will focus on trait compassion and mindfulness, meaning that an individual's general level of these variables will be measured (Sala et al., 2019).

The Present Study

To gain further insights into sustainable food consumption and its antecedents, the present study investigates the relationships between compassion for others, mindfulness and sustainable food consumption. As mentioned, research about individual dispositions such as compassion and mindfulness and how they influence sustainable behaviour has only recently gained attention and further investigation is required to explore their relationship. Moreover, further studies are needed that examine the five facets of mindfulness separately, and not solely mindfulness as a single facet. Additionally, little research exists about the direct influence of mindfulness as well as compassion on sustainable food consumption in particular.

Consequently, the present study will test two mediation analyses. In the first mediation analysis, the five mindfulness facets act as the independent variables, sustainable food consumption as the dependent variable, and compassion for others as the mediating variable (see Figure 1). In the second mediation analysis, compassion for others acts as the independent variable, sustainable food consumption as the dependent variable, and the mindfulness facets as the mediating variables (see Figure 2). Testing these mediation models can potentially demonstrate new findings within sustainable food consumption and the relationship with and within its antecedents. So far, no study exists that examined the relationship between the three variables of compassion for others, the mindfulness facets and sustainable food consumption altogether, although the preceding scientific evidence suggests relations between them. Based on the above, the following hypotheses were formulated.

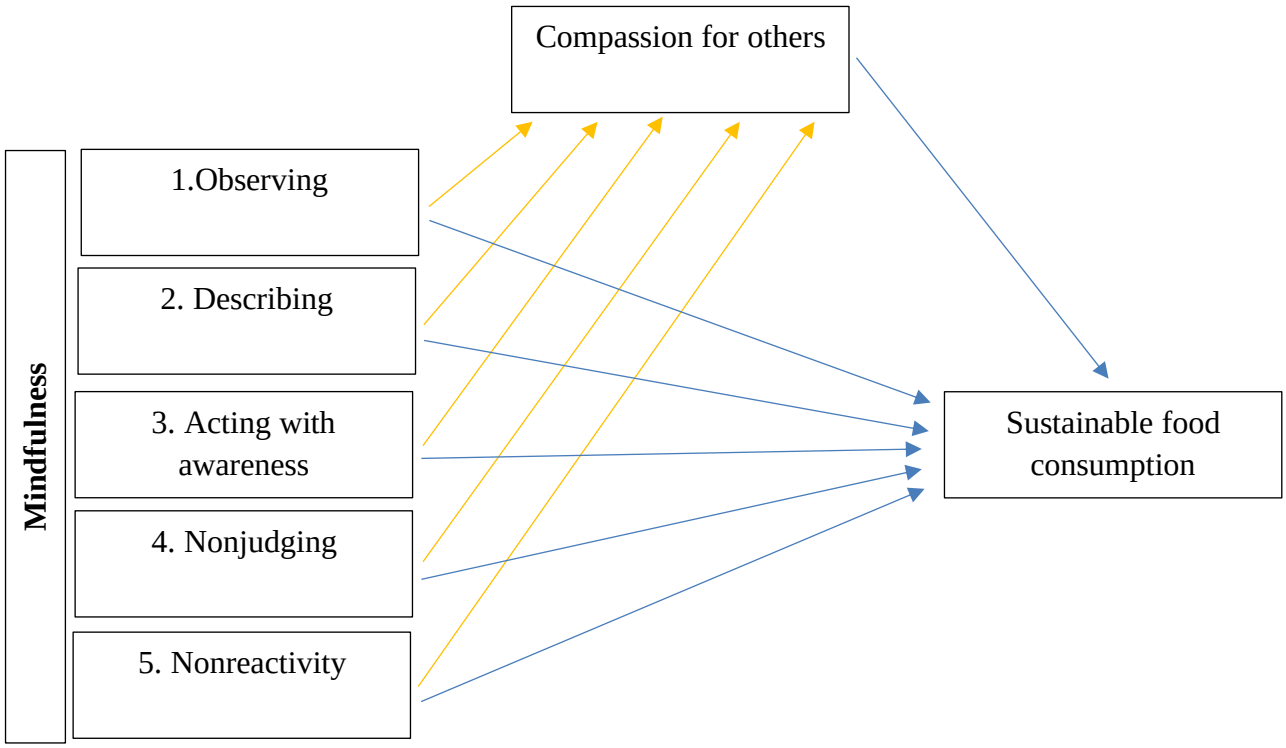
Relation of Mindfulness and Sustainable Food Consumption Mediated by Compassion

H_{1a}: People's mindfulness has a direct positive relationship with sustainable food consumption.

H_{1b}: People's compassion for others acts as a mediating variable, thereby declining the predicted relationship between mindfulness and sustainable food consumption.

Figure 1

Model of the Expected Compassion-Mediation Effect



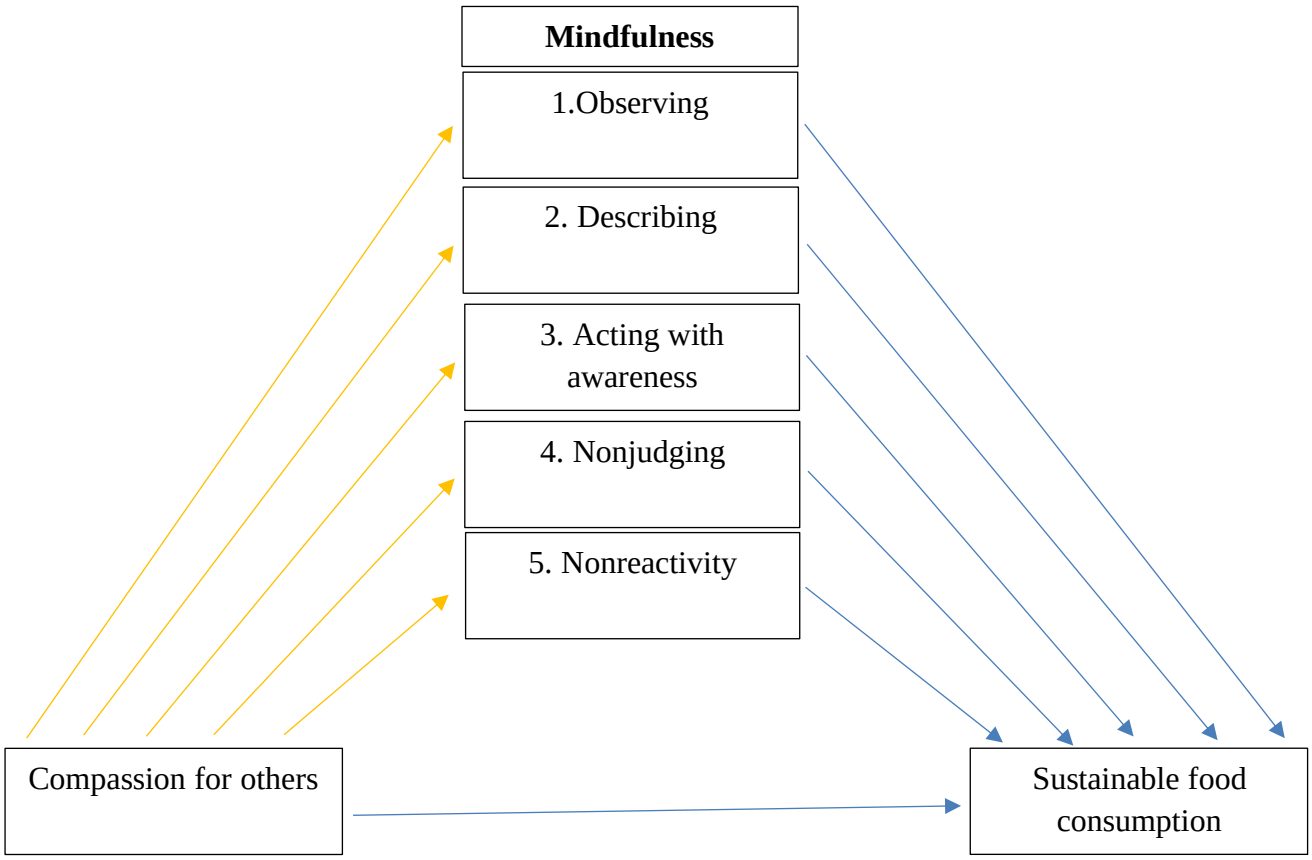
Relation of Compassion and Sustainable Food Consumption Mediated by Mindfulness

H_{2a}: People's compassion for others has a direct positive relationship with sustainable food consumption.

H_{2b}: People's mindfulness acts as a mediating variable, thereby declining the predicted relationship between compassion for others and sustainable food consumption.

Figure 2

Model of the Expected Mindfulness-Mediation Effect



Method

Design

The present study used a cross-sectional correlational research design. It also formed part of an online omnibus study, meaning that several researchers took part in it who each had different research questions and approaches. In addition, a within-subjects design was employed as all variables were measured only once and participants were not sorted into any groups. The research got approved by the ethics committee of the University of Twente before the data collection started.

Participants

Participants were recruited using convenience and snowball sampling and were mainly collected through the personal network of the participating researchers. To recruit as many participants as possible, the link of the survey was posted on social media and distributed via

WhatsApp by all researchers. Additionally, the survey was shared on the test subject pool of the University of Twente called ‘Sona Systems’. On this website, students from the Faculty of Behavioral, Management and Social Sciences of the University of Twente can gain credits by taking part in students’ surveys. To be included in the final dataset, participants were required to be 18 years old or older, have proficient English skills and have filled out all included survey questions.

The data collection took place from the seventh of April until the third of May. In total, 171 participants volunteered their time for the study. Fifty-three people did not fulfil the inclusion criteria and were therefore excluded. Consequently, the final dataset consisted of 118 people. Participants had a mean age of 27.6 (*SD* = 13.2). 83 % were German, 11 % were Dutch and 6 % had another nationality. 31 % of the participants were male and 69 % were female. Regarding the highest education level, it can be stated that 68 % of the participants had a high school degree or equivalent as their highest educational level. 13 % mentioned a Bachelor’s degree, and 12 % a Master’s degree. The sample mostly represented a student population from Germany and the Netherlands.

Instruments

For this study, the online survey tool ‘Qualtrics XM’ was used to develop an online questionnaire. In this questionnaire, three separate scales were included to respectively measure compassion for others, mindfulness and sustainable food consumption. The complete survey, as well as the consent form, can be found in the Appendix.

Demographic Variables

Before participants filled out the questions of the relevant scales, demographic questions were asked to gain more knowledge about the participants. In total, five questions got asked, namely sex, age, email address, nationality and level of education.

Compassion for Others

To measure compassion for others, the Compassion Scale (CS) by Pommier et al. (2019) was used. This scale contained 16 items that had to be answered, for example, “When people tell me about their problems, I try to keep a balanced perspective on the situation” (Pommier et al., 2019). Participants had to choose an answer from a 5-point Likert scale *(Almost never, rarely,*

occasionally, very frequently, almost always). The scale showed good reliability, with Cronbach's alpha = .79.

Mindfulness

The variable of mindfulness was measured using the Five Facet Mindfulness Questionnaire Short Form (FFMQ-SF) (Bohlmeijer et al., 2011). This scale consisted of 24 items which had to be answered by the participant on a 5-point Likert scale (*never or very rarely true, not often true, sometimes true, often true, very often or always true*). The scale comprised five facets of mindfulness namely, (1) observing, (2) describing, (3) acting with awareness, (4) nonjudging of inner experience and (5) nonreactivity to inner experience (Bohlmeijer et al., 2011). In total, five items were assigned to each of the facets, except for the first facet, which only consisted of four items. An example item for the first facet is "I pay attention to physical experiences, such as the wind in my hair or sun on my face". An example for the second facet is "I can easily put my beliefs, opinions, and expectations into words". " I rush through activities without being really attentive to them" is an example item for the third facet of 'acting with awareness'. For the fourth facet, an example item is: "I make judgments about whether my thoughts are good or bad". Lastly, "I watch my feelings without getting carried away by them" is an example item of the fifth facet. Concerning the reliability of the scale, it can be stated that the reliability of the first mindfulness facet was acceptable, with Cronbach's alpha = .67. The second as well as the third facets showed good reliability (α = .87; α = .85). The reliability of facets four and five was good as well, with Cronbach's alpha = .80 and = .74.

Sustainable Food Consumption

To estimate sustainable food consumption, the Green Eating Behaviour scale (GE Behaviour scale) by Weller et al. (2014) was used. The original scale consisted of a 6-item behaviour scale, two correlated 5-item subscales measuring advantages and disadvantages of green eating and another 8-item subscale measuring self-efficacy for green eating (Weller et al., 2014). For the purpose of this study, only the single 6-item behaviour scale was used (e.g. "How often do you buy meat or poultry products labelled "free range" or cage free?"). Answer possibilities ranged from 1 to 6 (*hardy ever*, *rarely* 25%, *sometimes* 50%, *often* 75%, *almost always*, *I do not eat meat/poultry products*). Moreover, another item was added that gives a definition of sustainable food consumption and asks whether the participant engages in it. For this item, the participant had

5 answer options, ranging from “I do not regularly practice green eating and do not intend to start within the next 6 months” to “I regularly practice green eating and have been doing so for 6 months or more”.

As the GE Behaviour scale was developed for an American population, some of the included items got adjusted to avoid misunderstandings for a Dutch and German sample. For example, the original item of “When in season, how often do you shop at farmer’s markets?” was changed to “How often do you shop directly at a farm?”, as farmer’s markets are an American concept and do not exist as such in Europe. Additionally, the original item “How often do you choose foods that are labeled USDA organic?” was changed into “How often do you choose foods labeled organic?”. Lastly, one item of GE Behaviour scale got deleted, namely “How often do you select meats, poultry, and dairy products that are raised without antibiotics or hormones?”. The reason for this is that in Europe, the use of growth hormones in farm animals is prohibited, and this item is therefore not applicable to a European sample population (European Commission, 2021).

Furthermore, as some essential aspects of sustainable food consumption were not covered by the GE Behaviour scale, four more items were included. These included the following: (1) “How often do you choose food that is imported by an airplane?”, (2) “How often do you select food with a sustainability label?”, (3) “How often do you eat seasonal fruits and vegetables?” and (4) “How often do you do a meat-free day in your week?”. These items were inspired by two other scales measuring sustainable food consumption. Items 1 and 3 are similarly displayed by Tobler et al. (2011). Items 2 and 4 are part of a scale from Verain et al. (2015). Cronbach’s alpha of the GE Behaviour scale was acceptable (α = .67).

Procedure

Before the participants could start with the survey, a consent form was presented to them, which they had to read and then give consent to. This consent form contained information about the purpose of the study, its procedure, potential risks and the matter of confidentiality and data storage. Only when participants gave consent, they would be forwarded to the demographic questions. After giving demographic information, participants were able to answer the three scales measuring the variables of compassion for others, mindfulness and sustainable food consumption. After answering all relevant scales for this study, participants were forwarded to the scales used by the other researchers. Lastly, participants were thanked for their participation and all researcher’s email addresses were displayed in case of questions or remarks about the survey.

Data Analysis

To investigate the collected data, it was exported from Qualtrics into the Statistical Program for Social Sciences (SPSS) 25, where it was further analysed. First, the answer option 'I do not eat meat/poultry products' of the GE Behaviour Scale was re-coded, as a technical issue in Qualtrics led to the fact that two numbers were assigned to this answer option. Then, negatively worded items were reverse coded. After that, mean scores for all scales were calculated. To explore the collected data, descriptive statistics were applied and frequencies were displayed. After that, a Pearson correlation matrix was created.

To test the hypotheses, two parallel mediation analyses were conducted using the PROCESS tool by Hayes (2018). Before the mediation analyses were conducted, linearity of the variables was tested. This was done by producing scatterplots after LOESS smoothing, which indicated a linear relationship between the three variables. For hypotheses H_{1a} and H_{1b}, the five mindfulness facets were used as the independent variables, compassion was inserted as the mediator and sustainable food consumption as the dependent variable. To check hypotheses H_{2a} and H_{2b}, another parallel mediation analysis was conducted. In this case, compassion acted as the independent variable, sustainable food consumption as the dependent variable and all five facets of mindfulness were inserted as the mediators. For all results, the confidence interval was set to 95%.

Results

Descriptive Statistics

To get a first indication about the frequency of sustainable food consumption among the participants, they had to self-assess their food consumption practices and whether they think it is sustainable or not. Results showed (see Table 1) that nearly half of the participants said about themselves that they practice sustainable food consumption for six months or more, which indicates that a quite large proportion of the sample considers itself as sustainable when it comes to their food consumption. Only few participants (16 %) mentioned that they do not practice sustainable food consumption and do not intend to start within the next six months. When comparing these results to the rest of the GE Behaviour scale, it becomes evident that the participants rather showed a medium level of sustainable food consumption when being presented with more precise questions about it, as can be seen in Table 2. This shows that when participants are asked generally about

whether they think they eat sustainably, they tend to think they do, but when being presented with more concrete examples of sustainable food consumption, they actually do not display them as much as they think.

Moreover, as can be obtained from Table 2, participants averagely scored quite high on the Compassion Scale (5-point Likert scale). Additionally, participants demonstrated medium scores on the Five Facet Mindfulness Questionnaire Short Form (5-point Likert scale).

Table 1

Frequencies of Sustainable Food Consumption

Answer options	N	%
Not regularly practising green eating…	19	16
Thinking about practising green eating…	13	11
Planning on practising green eating…	9	8
Regularly practising green eating for less than 6 months…	23	19
Regularly practising green eating for 6 months or more…	54	46

As displayed in Table 2, a positive correlation between the mindfulness facet of 'observing' and compassion could be observed. Moreover, a negative correlation between 'nonreactivity to inner experience' and compassion could be found. Another positive correlation was found between 'observing' and sustainable food consumption. Moreover, as can be expected, the five facets of mindfulness were positively correlated with each other.

Table 2

Pearson Correlation Matrix for Variables

Variables	1	2a	2b	2c	2d	2e	3	M	SD
1. Compassion								4.1	.41
2a. Observing	.24**							3.8	.65
2b. Describing	.18	.13						3.4	.83
2c. Acting with awareness	.01	.17	.38**					3.5	.80
2d. Nonjudging	.02	.13	.21**	.32**				3.1	.81

2e. Nonreactivity	-.19**	.03	.25**	.35**	.34**		2.9	.66
3.Sustainablefood consumption	.09	.22**	.10	.13	-.05	-.02	3.4	.60

**$p \leq .05$.

Mediation Analyses

Mediation Analysis for Hypotheses H_{1a} and H_{1b}

To test hypotheses H_{1a} and H_{1b}, a parallel mediation analysis was performed (see Table 3). As a first step, the direct effects of the five facets of mindfulness on sustainable food consumption were examined. In this case, only the relation between the facet 'observing' and sustainable food consumption was statistically significant, $B = .18$, $p = .03$. The four other facets did not show significant effects with regard to sustainable food consumption (see Table 3). Moreover, results showed that the facet 'observing' did significantly predict the mediating variable of compassion, $B = .14$, $p = .04$. Additionally, the facets 'describing' and 'nonreactivity' also significantly predicted compassion, $B = .12$, $p = .03$; $B = -.16$, $p = .02$. Non-significant relations between 'acting with awareness' and compassion, as well as 'nonjudging' and compassion were found (see Table 3). Compassion did not have a significant effect on sustainable food consumption (See Table 3). Lastly, the indirect effect between the mindfulness facets and sustainable food consumption was examined, which was non-significant, $B = .01$, *95-CI* [-.04, .05]. Consequently, it can be stated that the relationship between the mindfulness facets and sustainable food consumption was not mediated by the variable of compassion for others.

Based on these results, hypothesis H_{1a} can be partially accepted (see Figure 3). Only the mindfulness facet of 'observing' had a significant positive effect on sustainable food consumption. All other facets did not show significant results. Hypothesis H_{1b} has to be rejected, as compassion did not significantly mediate the relation between any of the mindfulness facets and sustainable food consumption (see figure 3).

Table 3

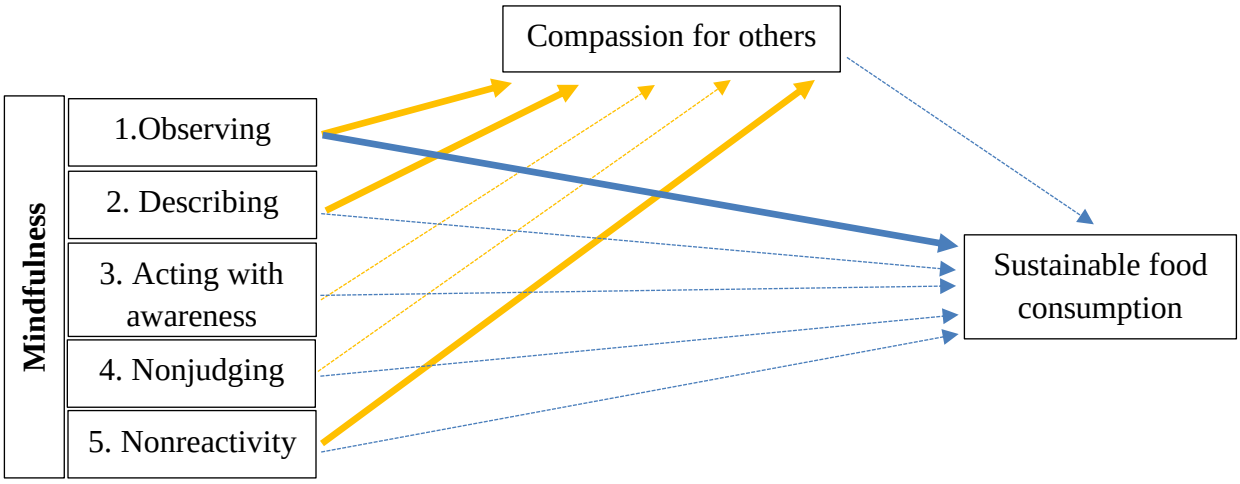
Mediation Analysis for H_{1a} and H_{1b}

Y = Sustainable food consumption
X = Mindfulness facets
M = Compassion

Effect	Coefficient	p	95% CI	
			LL	UL
Direct effect on Y				
Compassion	.04	.08		
Observing	.18	**.03**		
Describing	.04	.73		
Acting with awareness	.09	.42		
Nonjudging	-.08	.37		
Nonreactivity	-.03	.73		
Direct effect on M				
Observing	.14	**.04**		
Describing	.12	**.03**		
Acting with awareness	-.02	.74		
Nonjudging	.02	.66		
Nonreactivity	-.16	**.02**		
Indirect effect of X on Y	.01	-	[-.04	.05]

Figure 3

Model of the Observed Effects (1)



Note. Significant effects are illustrated by bold arrows.

Mediation Analysis for Hypotheses H_{2a} and H_{2b}

To test hypotheses H_{2a} and H_{2b}, another parallel mediation analysis was conducted (see Table 4). Results showed a non-significant direct effect between the variables compassion and sustainable food consumption, B = .04, p = .08. Compassion did have a significant effect on the mediating variables of 'observing', 'describing' and 'nonreactivity', B = .36, p = .04; B = .37, p = .01; B = -.30, p = .04. Again, non-significant effects of compassion on the facets 'acting with awareness' and 'nonjudging' were found (see Table 4). The facet 'observing' also had a significant effect on sustainable food consumption, B = .18, p = .03. Again, the other four facets did not show significant relationships with sustainable food consumption (see Table 4). After examining the indirect effects, it could be concluded that the mindfulness facets did not significantly mediate the relation between compassion and sustainable food consumption (see Table 3).

After examining the results of the second mediation analysis, hypotheses H_{2a} and H_{2b} must both be rejected (see Figure 4).

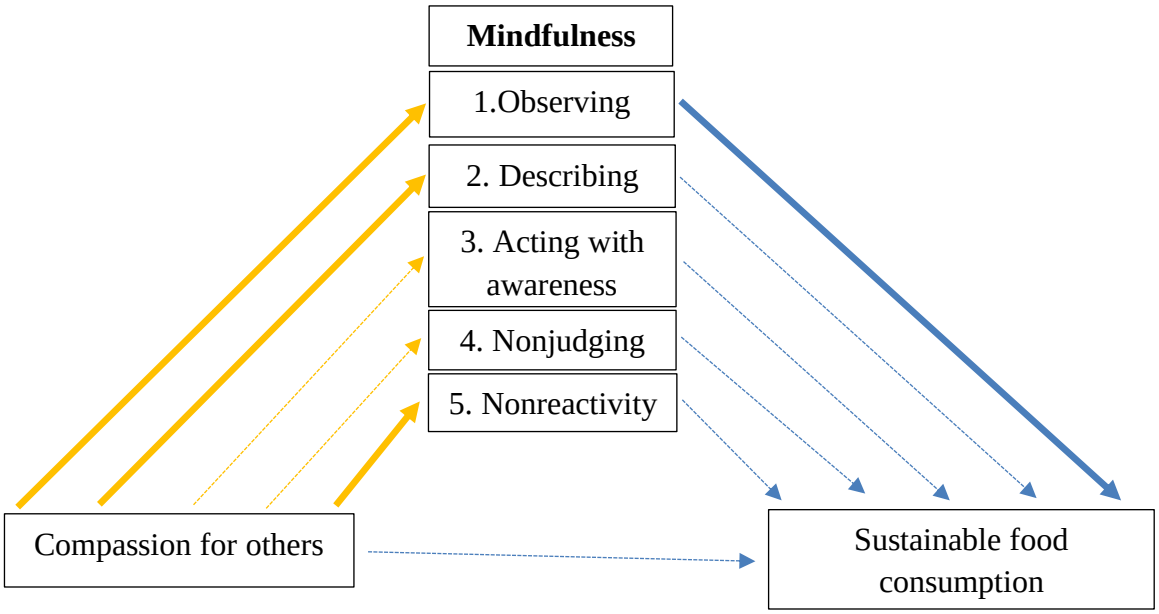
Table 4
Mediation Analysis for H_{2a} and H_{2b}

Y = Sustainable food consumption
X = Compassion
M1 = Describing
M2 = Observing
M3 = Acting with awareness
M4 = Nonjudging
M5 = Nonreactivity

Effect	Coefficient	p	95% CI	
			LL	UL
Direct effect on Y				
Compassion	.04	.08		
Observing	.18	**.03**		
Describing	.04	.73		
Acting with awareness	.09	.42		
Nonjudging	-.08	.37		
Nonreactivity	-.03	.73		
Direct effect of X on				
M1	.37	**.01**		
M2	.36	**.04**		
M3	.02	.91		
M4	.04	.85		
M5	-.30	**.04**		
Indirect effects of X on Y				
Observing	.07		[-.04	.22]
Describing	.01		[≤-.01	.15]
Acting with awareness	.001		[-.05	.06]
Nonjudgement	-.002		[-.05	.05]
Nonreactivity	.01		[-.05	.08]

Figure 4

Model of the Observed Effects (2)



Note. Significant effects are illustrated by bold arrows.

Discussion

The aim of this study was to contribute to an understanding of the nature of the relationships between compassion for others, mindfulness and sustainable food consumption. Against expectation, solely hypothesis H_{1a} could partially be accepted due to a significant observed effect between one of the five facets of mindfulness, namely 'observing', and sustainable food consumption. Hypotheses H_{1b}, H_{2a} and H_{2b} had to be rejected as no significant results could be found with regard to these hypotheses.

Taking into account the rejection of most hypotheses, three key findings of the present study can be found. First, compassion for others did not have a significant effect on sustainable food consumption. Second, only the mindfulness facet 'observing' was positively correlated to sustainable food consumption, whereas all other facets were not significantly related to it. Third, the variables of compassion for others and mindfulness were related to each other.

Non-Significant Effect Between Compassion and Sustainable Food Consumption

Whereas Pfattheicher et al. (2015) and Geiger and Keller (2018) found a positive relationship between compassion for others and sustainable behaviour, this relation could not be found in the present study. This can possibly be explained by the fact that the studies by Pfattheicher et al. (2015) and Geiger and Keller (2018) focused on general sustainable behaviour, whereas the present study's focus is specifically on sustainable food consumption, which might not be related to compassion for others. To clarify this, participants might have conceptualized the effects of unsustainable food consumption as not relating to human suffering, but rather the suffering of animals and the environment. In line with this, Geiger and Keller (2018) mentioned that when examining the relationship between compassion for others and sustainable behaviour, it is important that the examined sustainable behaviour actually contains an element of concern for the well-being of other people. For example, Geiger and Keller (2018) examined fashion consumption, which has obvious negative effects on humans, as the working conditions in the fashion industry are predominately inhumane. In the present study, it is arguable that the effects of unsustainable food consumption are rather associated with animal and environmental suffering than with human suffering, as unsustainable food consumption leads to the suffering of livestock and poor air, soil and water quality (Garnett, 2013). Although these consequences have negative impacts on human beings in the long run as well, such as reduced water resources in households and a decline in food diversity (Ritchie & Roser, 2020), this relation is less direct and sustainable food consumption is, therefore, less likely to show a significant relation with compassion for other people. These results also explain why no mediation effect in the first model could be found, as compassion for others was used as the mediator, which has to have a significant effect on the dependent variable to show a significant mediation effect.

Partially-Significant Effect between Mindfulness and Sustainable Food Consumption

The second key finding, which entails that the mindfulness facet 'observing' is positively correlated with sustainable food consumption, is in line with findings from Hunecke and Richter (2019), Barbaro and Pickett (2016) and Richter and Hunecke (2020). All of these studies found that 'observing' was positively related to sustainable food consumption or general pro-environmental behaviour. The authors explained this relation by saying that the ability to mindfully observe the environment enhances the possibility to discover ecological food products as alternatives to conventional food products (Barbaro & Pickett, 2016; Hunecke & Richter, 2019).

By discovering ecological food products, sustainable food consumption can be supported. Another possible explanation might be that through the observation of internal and external experiences, one could be more aware of one's own reflective processes which again might enhance intentions towards sustainable behaviour actions (Richter & Hunecke, 2020).

Strikingly, some items of the facet 'observing' refer to environmental aspects such as observing the wind in one's hair or the sun on one's face (Bohlmeijer et al., 2011). This again "point[s] to the relevance of the direct awareness of natural environments to engage in pro-environmental […] food consumption" (Richter & Hunecke, 2020, p. 1364). This finding underlines the notion that sustainable food consumption might rather be associated with environmental suffering than human suffering, which was also mentioned with regards to why compassion for others was not related to sustainable food consumption in this study.

Additionally, the finding that the four other mindfulness facets are not related to sustainable food consumption is also mentioned by Richter and Hunecke (2020). They stated that most studies examining the relationship between the mindfulness facets and sustainable consumption behaviour only found weak or non-significant effects regarding the facets of 'describing', 'acting with awareness', 'nonjudging' and 'nonreactivity' on sustainable food consumption. Therefore, the authors concluded that mindfulness is a rather distal antecedent of sustainable food consumption and that possible mediating variables play important roles here (Richter & Hunecke, 2020). In this context, they especially refer to concern for the environment or connectedness to nature as possible mediators.

Again, this explanation might account for the non-significant mediation effect of the second model. Probably, the direct effect of mindfulness on sustainable food consumption is too weak to show significant mediation effects in the general model.

Significant Effect between Compassion and Mindfulness

Concerning the found relationship between compassion for others and mindfulness, it can be said that this finding is consistent with discoveries made by Bluth and Blanton (2014) as well as Jazaieri et al. (2013). Both found that certain aspects of compassion and mindfulness influence each other and hypothesized that this relation is possibly iterative. Although both studies focused on self-compassion instead of compassion for others, their explanation of the relation between compassion and mindfulness can also be applied in the context of the current study: By being mindful, people become more aware of their thoughts, which leads to the recognition of judgement

and rumination. This recognition can help to increase kindness and compassion towards others. This again leads to a greater acceptance of oneself and further increases the recognition that suffering is just a part of the common human experience. Recognizing this again leads to an increase in the awareness of thoughts, thereby closing the possible iterative cycle of the relationship between compassion and mindfulness (Bluth & Blanton, 2014). Additionally, even most of the exact relationships between compassion and the mindfulness facets found in this study are supported by past research: The current finding of a positive relation between the mindfulness facet of 'observing' and compassion is supported by López et al. (2016) and Medvedev et al. (2021). These authors explained that being able to observe internal as well as external experiences is essential for feeling compassion for others, as without the observing and noticing of suffering, feelings of compassion would not emerge (López et al., 2016; Medvedev et al., 2021). Moreover, the result that compassion had a negative effect on the facet of 'nonreactivity to inner experience' is also supported by past research. For example, Stellar (2013) found that experiencing compassion actually activates people's bodily responses and motivates care-taking and socially supportive behaviours towards those who are suffering. In line with this, Pfattheicher et al. (2015) explained that compassion is characterized by an actual action-tendency, meaning that compassionate people are more likely to take action when being confronted with the suffering of others. Furthermore, the finding that compassion has a positive relation with the mindfulness facet of 'describing' is in line with the results of the study of López et al. (2016). The authors do not give an explanation for this relationship, but it is possible that compassionate people are simply more aware of the suffering of others and are therefore better able to find the words to describe what they are seeing and feeling. In line with current results, Medvedev et al. (2021) also found a non-significant effect between the mindfulness facet 'acting with awareness' and compassion. In their study, this facet was positively related to the facets 'nonjudging' and 'describing' and might therefore have a rather indirect effect on compassion for others. However, the study by Medvedev et al. (2021) did found a significant effect between the facet 'nonjudging' and compassion, whereas this was not found in the current study. Again, it is possible that this facet is rather related to the other facets and also has an indirect effect on compassion. This is supported by Leeuwerik et al. (2019) who mention that a conceptual overlap between the mindfulness facets exists. In accordance with this, Medvedev et al. (2021) found that the facet 'nonjudging' is related to all other four facets.

Limitations and Recommendations

Several possible limitations can be recognized in this study. As a first limitation, the employed study design does not allow to make causal claims about the relationship between the variables. This means that is not clear which variable influences the other, but only a general correlation between them can be observed. Concerning future research, one could integrate mindfulness and compassion training for the participants. By doing so, differences between groups could be discovered and more detailed information about the direction of relationships between the variables could be gathered. Furthermore, by studying mindfulness and compassion training, one could learn more about whether it is possible to enhance sustainable behaviours through training certain individual dispositions, which is hypothesized by Wamsler (2019).

As a second limitation, compassion and mindfulness were treated as decontextualized traits in this study, meaning that the variables were measured once among people to see whether they differ from each other regarding their levels of compassion and mindfulness and situational influences were completely ignored (Howell et al., 2017). However, literature states that little is known about whether such traits are actually displayed in everyday life, and it is hard to detect a connection between traits and everyday behaviour with a one-time self-report measure (Fleeson & Law, 2015). When measuring the variables as states, it is easier to connect them to situational contexts as the variables are measured several times a day and thus do account for situational influences (Geiser et al., 2017). Therefore, it could be useful to extend the current findings by using an experience sampling method in which compassion and mindfulness could be treated as personality states instead of traits. This way, a more contextual understanding of the influence of these variables on sustainable behaviour could possibly be observed.

Third, another limitation entails the use of self-report measures. People might have insufficient knowledge about the used concepts to fully understand them or might be biased about their levels of compassion, mindfulness and sustainable food consumption due to their own desires or cultural standards (Bergomi et al., 2013; Ives et al., 2020). Consequently, literature suggests that future researchers could measure event-related brain potentials instead of using self-report measures, as feeling compassion and experiencing mindfulness lead to electrophysiological responses in the brain (Baker et al., 2017; Bostanov et al., 2018). Additionally, future research could use diary entries or laboratory experiments to detect more precise measures of sustainable food consumption.

Fourth, another limitation is that the compassion and mindfulness scales refer to the general concepts of them and do not relate to sustainability or food consumption at all. However, as stated by Shapiro et al. (2006), when wanting to use concepts such as compassion or mindfulness to reach a certain goal, it is essential to intentionally use the concepts. To clarify, if you want to use mindfulness to decrease unsustainable consumption patterns, you have to be mindful with special regard to food consumption. Therefore, it might be interesting to investigate whether compassion and mindfulness scales that refer specifically to sustainability would yield different results than the general scales used in this study. In addition to this, future research could also investigate different mediating variables, such as concern for the environment, compassion for the environment or connectedness to nature, as it is possible that sustainable food consumption is less associated with the suffering of other people, but rather with the suffering of the environment.

When it comes to the generalizability of the present study, the results have to be handled with care. First, participants were part of a convenience sample and are not necessarily representative of the general population. Second, the sample used in this study had a relatively young mean age ($M_{age} = 27.63$) and mostly consisted of students. Possibly, these young participants have more knowledge about sustainability and the concepts of mindfulness and compassion than older generations as these topics are more and more discussed and informed about on social media (Altouma, 2020; Van Dam et al., 2017). This is in accordance with the finding of the current study, which showed that participants scored strikingly high on the Compassion Scale. On the contrary, it is also possible that an older sample size would score higher on mindfulness, as these people have learned to maturely manage their emotions, which makes them more likely to stay in the present moment and not be too preoccupied with their feelings (Alispahic & Hasanbegovic-Anic, 2017). Consequently, it would be interesting to see whether differences in results would emerge with an older sample.

Conclusion

Unsustainable food consumption is a major contributor to climate change and long-lasting solutions need to be found to protect the environment, animals as well as human beings. In this context, scholars consider it to be worthwhile to examine human individual dispositions such as compassion and mindfulness. These individual dispositions can enhance the chance to take action against climate change, lead to a clearer understanding of it and can additionally be enhanced through certain techniques, which makes them highly valuable in climate change mitigation.

Although in the present study, the individual dispositions of compassion for others and mindfulness seem to be only weakly, or not at all, related to sustainable food consumption, a lot of sustainable behaviours have still been largely unexplored concerning the influence of compassion and mindfulness on them and it is, therefore, essential to further investigate individual dispositions as well as different sustainable behaviours. Altogether, this study can be seen as a step towards integrating two lines of research, namely individual dispositions and sustainability research, that, up to date, have only scarcely been linked to each other. Understanding the underlying mechanisms in the relationship between individual dispositions and sustainable behaviour can help to design solutions for climate change, possibly leading to a more sustainable future.

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Appendix

Consent Form and Questionnaire

Consent Form

You are being invited to participate in a research study titled **Pro-environmental Behaviour and Compassion.** This study is being done by students from the Faculty of Behavioural, Management and Social Sciences at the University of Twente.

The purpose of this research study is to investigate the effect of pro-environmental behaviour on compassion. The study consists of two parts. The first part is this survey, which will take you approximately **15-20** minutes to complete. The second part is a follow-up survey, which will be sent to you in two weeks. The collected data will be used for the students' bachelor theses. Your participation in this study is entirely voluntary and you can withdraw at any time. You are free to omit any question.

We believe there are no known risks associated with this research study; however, as with any online related activity, the risk of a breach is always possible. To the best of our ability, your answers in this study will remain confidential. We will minimize any risks by storing data confidentially.

Collecting personal contact information (e-mail addresses) is essential for this study as it requires a follow-up study in two weeks.

Study contact details for further information:

Josie Vorhauer (j.vorhauer@student.utwente.nl)
Aline Sinn (a.sinn@student.utwente.nl)
Malin Holtemeyer (m.holtemeyer@student.utwente.nl)
Leo Rütgers (l.ruetgers@student.utwente.nl)
Cheyenne Schley (c.j.m.schley@student.utwente.nl)

- I consent to the use of my data.

Demographics

Sex

- Male
- Female
- Other

Age

- 'Participant inserts age'

Please indicate your e-mail address. This information is needed for receiving the follow-up survey in 2 weeks.

- 'Participant inserts e-mail address'

What is your nationality?

- Dutch
- German
- Other

What is the highest level of education you have obtained so far?

- No formal education
- High school degree or equivalent
- Vocational training
- Bachelor's degree (e.g. BA, BS)
- Master's degree (e.g. MA, MS)
- Doctorate (e.g. PhD)
- Other

Green eating includes participating in most of the following behaviors:
- eating locally grown foods, produce that is in season and a limited amount of processed foods
- consuming foods and beverages that are labelled fair trade certified or certified organic
- consuming meatless meals weekly and (if consuming animal products) selecting meats, poultry and dairy that do not contain hormones or antibiotics

Based on the definition of green eating, which of the following best describes you now:

- I do not regularly practice green eating and do not intend to start within the next 6 months
- I am thinking about practicing green eating within the next 6 months
- I am planning on practicing green eating within the next 30 days
- I regularly practice green eating and have been doing so for less than 6 months
- I regularly practice green eating and have been doing so for 6 months or more

Please select the answer that best describes your usual behavior.

(6-point Likert scale, 1= hardy ever, 2= rarely 25%, 3= sometimes 50%, 4= often 75%, 5= almost always, 6= I do not eat meat/poultry products)

- How often do you buy meat or poultry products labelled “free range” or “cage free”?
- How often do you choose foods labelled organic?
- How often do you select food or beverages labelled fair-trade certified?
- How often do you choose food that is imported by an airplane?
- Locally gown foods are grown within your country. Based on this, how often do you eat locally grown food?
- How often do you shop directly at a farm? E.g. for eggs, milk, etc.
- How often do you select food with a sustainability label?
- How often do you eat seasonal fruits and vegetables?
- How often do you do a meat-free day in your week?

Here are some advantages and disadvantages to Green Eating. Please indicate how important each one is in your deciding to eat green.
(5-point Likert scale, 1= not at all important, 2= somewhat important, 3= neutral, 4= very important, 5= extremely important)

- Eating green is not practical in my life right now.
- Eating green can be too expensive.
- By eating green, I can help protect the planet.
- Eating green would be too difficult.
- Eating minimally processed food is better for my health.
- By eating green I can support the local economy.
- Sustainably produced foods are not available to me.
- I am proud that I can help the environment by eating green.
- I can’t find green foods where I shop.

Compassion
(5-point Likert scale, 1= almost never, 2= rarely, 3= occasionally, 4= very frequently, 5= almost always)

- I pay careful attention when other people talk to me about their troubles.
- If I see someone going through a difficult time, I try to be caring toward that person.
- I am unconcerned with other people’s problems.
- I realize everyone feels down sometimes, it is part of being human.
- I notice when people are upset, even if they don’t say anything.
- I like to be there for others in times of difficulty.
- I think little about the concerns of others.
- I feel it’s important to recognize that all people have weaknesses and no one’s perfect.
- I listen patiently when people tell me their problems.
- My heart goes out to people who are unhappy.

- I try to avoid people who are experiencing a lot of pain.
- I feel that suffering is just a part of the common human experience.
- When people tell me about their problems, I try to keep a balanced perspective on the situation.
- When others feel sadness, I try to comfort them.
- I can't really connect with other people when they're suffering.
- Despite my differences with others, I know that everyone feels pain just like me.

Mindfulness

(5-point Likert scale, 1= never or very rarely true, 2= not often true, 3= sometimes true, 4= often true, 5= very often or always true)

- I'm good at finding words to describe my feelings.
- I can easily put my beliefs, opinions, and expectations into words.
- I watch my feelings without getting carried away by them.
- I tell myself I shouldn't be feeling the way I'm feeling.
- It's hard for me to find the words to describe what I'm thinking.
- I pay attention to physical experiences, such as the wind in my hair or sun on my face.
- I make judgments about whether my thoughts are good or bad.
- I find it difficult to stay focused on what's happening in the present moment.
- When I have distressing thoughts or images, I don't let myself be carried away by them.
- Generally, I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.
- When I feel something in my body, it's hard for me to find the right words to describe it.
- It seems I am "running on automatic" without much awareness of what I'm doing.
- When I have distressing thoughts or images, I feel calm soon after.
- I tell myself that I shouldn't be thinking the way I'm thinking.
- I notice the smells and aromas of things.
- Even when I'm feeling terribly upset, I can find a way to put it into words.
- I rush through activities without being really attentive to them.
- Usually when I have distressing thoughts or images I can just notice them without reacting.
- I think some of my emotions are bad or inappropriate and I shouldn't feel them.
- I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.
- When I have distressing thoughts or images, I just notice them and let them go.
- I do jobs or tasks automatically without being aware of what I'm doing.
- I find myself doing things without paying attention.
- I disapprove of myself when I have illogical ideas.

DON'T FORGET TO CLICK ON THE ARROW DOWN BELOW, OTHERWISE YOUR ANSWER WILL NOT BE COUNTED.

Thank you for participating in our survey! You will receive the follow-up questionnaire in 2 weeks,

which will take less than 5 minutes to complete. If you have any questions don't hesitate to contact us:

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