

The logo of the University of Twente is positioned on the left side of the cover. It features a stylized pen nib pointing downwards, with several yellow, faceted, diamond-like shapes scattered around it. A cluster of black and red dots of varying sizes is located at the bottom left, partially overlapping the pen nib's path.

UNIVERSITY OF TWENTE.

MASTER THESIS

Feelings for the suffering of others: Do peers influence pro-environmental behaviour mediated by state compassion?

An Experience Sampling Method Study

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Abstract

Background: Climate change, water pollution, and biodiversity loss are just some of the environmental issues we are facing today, and the need to act pro-environmental is urgent. It is, therefore, crucial to investigate the determinants of pro-environmental behaviour (PEB). Peer influences were found to affect prosocial behaviours like PEB and also compassionate responses, however, most of the studies used cross-sectional data neglecting the fluctuating nature of emotional states like compassion and situational cues influencing our behaviour. No study to date has examined the three constructs together in a real-time and real-life setting. Therefore, this study aims to investigate whether peer influences predict state pro-environmental behaviour and if this association is mediated by the emotional state of compassion.

Methods: The experience sampling method (ESM) with an interval-contingent design was used. For a period of 8 consecutive days in a sample of $N=33$ participants, peer influence, state compassion, and state pro-environmental behaviours were measured. Four self-designed items based on the Pro-environmental Behaviors Scale (PEBS), two self-designed items for assessing peer influence and one item from the Compassion Scale (CS) were used. Several LMM analyses and a Sobel test were done to investigate whether peer influences predict state pro-environmental behaviour mediated by state compassion.

Results: The participants were rather high in state compassion, relatively high in state PEB and had on average company that was perceived to care for the environment. Levels of state compassion did not vary within-subjects, however, levels of state PEB did vary within-subjects and also the perceptions participants had about their company varied. LMM analyses showed that peer influences did not predict state PEB, $F(1, 589.428) = 0.107$, $p = .74$, and a Sobel test revealed that the mediation effect of state compassion on the association between peer influences and state pro-environmental behaviour was not significant ($z = 0.48$, $SE = 0.01$, $p = .63$).

Conclusion: The current study has extended the literature about possible antecedents of pro-environmental behaviour by showing that being with someone perceived to care for the environment does not affect state PEB mediated by state compassion. However, no pertinent conclusion can be drawn based on these null findings and more research in this field is needed as the current environmental issues pose a great threat to human survival and the so-called point of no return from which the climate crisis and other issues can no longer be averted comes closer.

1. Introduction

Global warming, water pollution, and various other environmental issues pose a great threat to human survival and general environmental sustainability. Compared to preindustrial times, the mean temperature increased already by 1,2°C, and it keeps rising due to increased greenhouse gas emissions like carbon dioxide (CO₂) and other human activities (IPCC, 2019). There is consensus among scientists that keeping the increase in global mean temperature below 1.5°C will limit the damage significantly compared to an increase of 2°C (IPCC, 2019). For instance, the Intergovernmental Panel on Climate Change (IPCC) report predicts with high confidence that limiting global warming to 1.5°C compared to 2°C will result in 420 million fewer people being frequently exposed to extreme heatwaves and it will reduce the loss of biodiversity, so less species loss from 18% of insects, 16% of plants, 8% of vertebrates to 6% of insects, 8% of plants, and 4% of vertebrates. Additionally, concerning the artic, global warming below 1.5°C would lead to one sea-ice-free arctic summer every 100 years instead of every 10 years. The list of benefits resulting from a limit of global warming below 1.5°C is long and shows how important immediate action is. Furthermore, other human activities like the pollution of our planet, onshore and ocean-wide, have far-reaching consequences (Jambeck et al., 2015). For instance, 100 million marine animals die each year due to the plastic waste humans discard in the oceans. Every single plastic item that goes through our hands stays on this planet as plastic needs 500 to 1000 years to degrade. Moreover, human behaviour is responsible for an estimated 5.25 trillion pieces of plastic waste in our oceans alone (Jambeck et al., 2015). Scientists agree that human behaviour is mainly responsible for the above-described issues, which means changing our behaviour is also the solution. Therefore, acting in a pro-environmental way is key to mitigate the damage we cause and investigating the possible antecedents of it is crucial. Thus, the current study will focus on possible factors influencing pro-environmental behaviour.

Pro-environmental behaviour can be defined by its intention or its impact. An intent-oriented approach defines pro-environmental behaviour generally as any behaviour that has the intention to reduce the negative impact an action might have on the environment (Gifford, & Nilsson, 2014). The impact-oriented approach defines pro-environmental behaviour by the consequences an action has (Stern, 2000). Thus, it is considered more crucial to look at the actual outcome, whatever the intention of behaviour. For example, if a person decides to buy an electric car instead of a gasoline-engined car, the intention might be pro-environmental, however, if the person then is charging the car then with energy from coal-fired power plants, the initial behaviour cannot be seen as pro-environmental anymore as it still harms the

environment. So, the impact-oriented approach first determines the most critical environmental issues caused by human actions and then identifies the specific behaviours responsible for the negative consequences (Stern, 2000). This strategy makes it possible to investigate the driving forces behind behaviours that affect the environment the most and mitigate the damage humans are responsible for.

Furthermore, pro-environmental behaviour can be classified into four categories: *environmental activism*, *non-activist behaviours in the public sphere*, *private sphere environmentalism*, and *other environmentally significant behaviour* (Stern, 2000). The first category concerns active engagement in demonstrations and environmental organizations. So, it includes political and social activism. The second category, non-activist behaviours in the public sphere, focuses on behaviours like petitioning on an environmental issue or the willingness to pay higher taxes to protect the environment. Stern, Dietz, Abel, Guagnano, and Kalof (1999) argue that although these behaviours seem to be more indirect forms of pro-environmental behaviour, they can impact, for example, policies and are therefore essential to consider. Furthermore, the third category, private sphere environmentalism, concerns the behaviour and decision of individuals. This includes, for instance, purchases, waste disposal, recycling, and many other daily decisions of individuals. Even though individual behaviours have only a small effect on the environment if many people behave in the same way, the impact increases. The last category summarizes all behaviour that is not included in the previous three categories, for example, the decisions of bankers, investors, or engineers within their organization which lead to an environmentally friendly outcome.

So, although the need to act in a pro-environmental way is urgent and it is known which behaviours would benefit the environment, some people change their behaviour in favour of the environment, and others do not. Therefore, besides environmental consideration, other factors come into play. One possible factor may be the social environment, so the influences peers and family members have on an individual in a specific situation (Gilbert, 2005). Humans are social beings that are influenced by peers and family members to a great extent (Prinstein & Dodge, 2008). Peers have been shown to influence all kinds of behaviours. Although most of the research investigating peer influences focus on maladaptive behaviours, there is also evidence that peer influence can be adaptive and lead to positive psychosocial outcomes (Boruah, 2016; Costello & Zozula, 2018). Theories about social influence showed that social norms are passed on by family and peers within the social circle of an individual. They can be defined as the “rules and standards that are understood by members of a group,

and that guide and/or constrain social behaviour without the force of laws” (Cialdini and Trost, 1998, p. 152). Social behaviour is influenced or guided by peers to a great extent as their social norms imply that a certain behaviour should or should not be performed (Park & Lessig, 1977; Thøgersen, 2008). This also offers the potential to actively influence pro-environmental behaviours, for example, through peer pressure. A study done by Wolske, Gillingham, and Schultz (2020) showed that participants started to use solar systems when they saw their neighbours using them because they wanted to adjust to the norms of their neighbours and felt socially pressured to do so. Moreover, a study of Suki and Suki (2019) also found peer influences to be a significant factor concerning green purchasing behaviours. Recent studies about PEB based on the theory of planned behaviour also acknowledge and include subjective norms of family and friends to investigate recycling behaviour (Chen and Tung, 2010) or sustainable textile consumption (Kang et al., 2013). Thus, the people we surround ourselves with and our perception of their social norms influence our own norms and values and, consequently, our behaviour. Moreover, the social situation an individual finds himself/herself in can also influence emotional states like the level of compassion in an individual (Seppälä et al., 2017) and compassion was also found to be a relevant factor influencing pro-environmental behaviours (Pfafftheicher, Sassenrath, & Schindler, 2016). In line with these findings, compassion will be the focus of the current study as a mediator on the association between peer influences and PEB.

Compassion stems from the Latin word “*compati*” which means “to suffer with,” and there is great consensus among researchers that compassion can be generally defined as having feelings for the suffering of others and the motivation to alleviate the suffering (Gilbert, 2005). For instance, Goetz et al. (2017) defined it as: “the feeling that arises in witnessing another's suffering and that motivates a subsequent desire to help” (p. 351). So, the definitions of compassion have in common that they extend the meaning of the word by adding the factor of wanting to help others relieve their suffering. Compassion can be further conceptualized in two different ways: a dispositional factor and a specific emotion (Seppälä, Simon-Thomas, Brown, Worline, Cameron, & Doty, 2017). For example, if compassion is seen as a dispositional factor, the overall tendency to be compassionate or endorse compassion as a core value is assessed. This means compassion is seen as a trait and the focus lies on investigating the motivational, temperamental, and cognitive aspects of compassion that influence the probability of experiencing compassion (Lutz, Brefczynski-Lewis, Johnstone, & Davidson, 2008; Sprecher, Fehr, & Zimmerman, 2007). On the other hand, compassion being a specific emotion, is conceptualized like other emotions as “coherent and

organized, yet flexible, responses to events that are shaped by both biological and social factors" (Seppälä, Simon-Thomas, Brown, Worline, Cameron, & Doty, 2017). State compassion is comparable to other emotions like love or pride and has specific patterns associated with its experience (Runyan, Fry, Steenbergh, Arbuckle, Dunbar, & Devers, 2019). For instance, situational cues, like the perceived characteristics of the suffering one, modulate the emotional response. The more similar an individual perceives the suffering one, the more likely he/she will feel compassion and act to help. This is also in line with the findings of Tajfel, Brown, and Turner (1979), which state that people provide more help to peers and family members, so members of the ingroup of an individual. Thus, compassionate states can be increased and decreased by situational cues like the people we surround ourselves with (Penner, Dovidio, Piliavin, & Schroeder, 2005).

Furthermore, Gilbert (2005) states that compassionate individuals possess a "prosocial action tendency", and may, therefore, intervene in the association between peer influence and pro-environmental behaviour as a mediator. In line with this assumption, a recent study by Runyan, Fry, Steenbergh, Arbuckle, Dunbar, and Devers (2019) used the experience sampling method to investigate the interactions between compassion and prosocial behaviours like donating and found that compassion predicted prosocial behaviours towards those in need. Moreover, two recent studies by Pfattheicher, Sassenrath, and Schindler (2016) investigated the relationship between compassion and pro-environmental intention and showed that compassion is positively correlated with pro-environmental tendencies. The results of their first study showed that compassion significantly predicts one or more donations to pro-environmental organizations. Furthermore, in their second study, they compared the pro-environmental intentions between participants in a "high-compassion" condition and participants in a "low-compassion" condition. The findings demonstrated that participants in the high-compassion group reported more pro-environmental tendencies than the "low-compassion" group. This correlation can be explained to some extent by the general relationship between prosocial behaviour and compassion.

All of the findings mentioned above imply that situational factors like the perception we have about the person we are within a specific situation can enhance compassionate states and prosocial behaviours. However, most recent research used cross-sectional data or an experimental study design neglecting the fluctuating nature of compassionate states in everyday situations. Additionally, all of the above-mentioned studies contained in each case only two of the three constructs, so no study to date has examined how the three constructs of peer influence, state compassion, and state PEB are related and influence each other in real-

life situations. Therefore, this study aims to investigate how the presence and perception of another person in a specific situation influence state PEB and if this association is mediated by state compassion. Based on the above-discussed findings that peers and family members influence the level of compassion as well as pro-environmental behaviours in an individual in a specific situation and that individuals high in compassion are more likely to act pro-environmental, it is hypothesized:

H1: Being with someone perceived to care for the environment predicts pro-environmental behaviour mediated by state compassion.

2. Methods

2.1 Design

For this study, the experience sampling method (ESM) design was used. For a period of 8 days, the peer influence, compassion, and pro-environmental behaviours of the participants were measured in a real-life and real-time setting. Furthermore, an interval-contingent design was chosen, which means the measures took place three fixed times per day.

2.2 Participants

The main inclusion criteria were: 18 years old or older, owning a smartphone to fill out the daily measures, and possessing sufficient English language proficiency as the questionnaires were displayed in English. Due to the high number of repeated measures, a small sample size of 30 participants was intended, which still provides sufficient reliability, according to Conner and Lehman (2012). A heterogeneous-convenient sample was recruited through non-probability sampling.

2.3 Materials

ETHICA Application

A questionnaire was created using the ETHICA application to execute the daily measures of peer influence, compassion, and pro-environmental behaviour. ETHICA is a mobile application created to perform short-term and longitudinal studies. Through this application, one can design questionnaires and can set daily reminders for different times of the day, which is needed for the ESM design of this study.

Baseline Measure

Demographics

The first four items asked for the demographic characteristics of the participants. The age, gender, nationality, and occupation are asked (eg. “How old are you?”).

Daily Measures

Pro-Environmental Behaviours

To assess the participants' pro-environmental behaviours, four self-designed items based on the four factors of the Pro-environmental Behaviors Scale (PEBS; Markle et al., 2013) were used. The items cover the factors of energy conservation (“*To me it is important to limit my energy use*”), food (“*To me it is important to limit my meat consumption*”), environmental citizenship (“*To me it is important to talk to others about their environmental behaviors*”) and transportation (“*To me it is important to limit my use of the car*”). The statements are rated on a 7-point Likert scale ranging from 1 = “Totally disagree” to 7 = “Totally agree”.

Compassion

To measure the state-compassion of the participants, the item “*I like to be there for others in times of difficulty*” of the Compassion Scale (CS) by Pommier, Neff, and Tóth-Király (2019) was selected. The chosen item was considered to be most close to the generally accepted definition of compassion as “it is a felt response to suffering that involves caring and an authentic desire to ease distress” (Goetz, Keltner, & Simon Thomas, 2010). Again the statement is rated on a 7-point Likert scale (1 = “Totally disagree” and 7 = “Totally agree”).

Peer influence

The peer influence is examined with two items. The first item asks if the participant had contact with another person during the present moment or during the last hour (“*Are you with someone now or during the past hour?*”). The answer can either be “yes” or “no”. If the participant states “no” the following item was skipped. However, if the participant had contact during the present moment or the last hour, the impression of the participant about the pro-environmental behaviour of the counter partner is asked by showing the following statement to the participant: “*The person(s) I am with find(s) it important to care about the environment*”. The answer is given on a 7-point Likert scale ranging from 1 = “Totally disagree” to 7 = “Totally agree”

2.4 Procedure

The study took place from the 8th of April 2021 until the 26th of April 2021. Ethical approval was provided by the Faculty of Behavioural Sciences Ethics Committee of the University of Twente (210386). To recruit participants for the study, the researcher approached peers and family members via face-to-face interactions and/or texted them an invitation letter with a short description of the study topic and the design to ensure the participants were aware of the intensity of the study (several actions per day). Furthermore, they were ensured that the participation was voluntary and that they could end their participation at any time of the study without providing a reason. If a person decided to participate in the current study, the invitation letter provided a link at the end which led to the website of the ETHICA application. On this website, the information from the invitation letter was presented again (see Appendix). The person could click on the button "Participate" to download the ETHICA application used for the study. The participant then had to either register a new account or login into his/her already existing account.

On the first day, participants filled out a short questionnaire about their demographics, and after that, the data collection with the daily measures began. The participant was reminded three times a day (9:00-12:00h; 14:00-17:00h; 19:00-22:00h) to fill out the same short questionnaire for 8 consecutive days. An additional reminder was sent after 30 minutes to the participants if the person did not fill out the questionnaire yet. It took no more than 5 minutes to complete per questionnaire, so approximately 15 minutes per day. The daily questions expired 1.5 hours after the initial reminder, and participants were asked to fill out as many as they could manage. After the 8th day, the participation ends, and the participants are thanked for their participation. In case of any questions or additional remarks, the email addresses of the researcher are provided again.

2.5 Analysis

The data gathered through the ETHICA application was imported into the IBM SPSS statistics program version 26. Data of participants who missed filling in more than 40% of the daily questionnaires were excluded from the analysis following the guidelines of Conner and Lehman (2012). For the remaining participants, Little's MCAR test revealed that missing values of the daily measures were completely at random ($p = .07$). Descriptive statistics were used to analyze the demographic characteristics of the participants (age, gender, occupation, and nationality).

Cronbach's alpha was calculated for the four pro-environmental behaviour items to examine their internal consistency and thus assess their reliability. Values $< .5$ show

unacceptable internal consistency, values $> .6$ reflect questionable internal consistency and values $> .7$, $> .8$, and $> .9$ show acceptable, good and excellent internal consistency, respectively (George & Mallery, 2003). The items had acceptable internal consistency with Cronbach's alpha .76. For the item assessing state compassion, no reliability test was done due to its expected variability.

To enable a between-person analysis of state compassion, a person mean (PM) score was calculated averaging state compassion scores across all 24-time points per participant. Additionally, to allow for within-person analysis of state compassion, person-mean centred scores (PMC) were calculated for each participant subtracting their state compassion score of each time point with their PM scores of state compassion. The PMC allows for within-person analysis because they reflect the momentary deviations in state compassion and state pro-environmental behaviour compared to the average person mean of every participant per measurement point. The same procedure was done with the state pro-environmental behaviour scores. To get an impression of the within-subject variation and between-subject variation of state compassion, state PEB and the perceptions of the persons the participants had company with, boxplots were created for each participant. By this, it is possible to see the range of answers of each participant, the fluctuations over time, and how the participants differed compared to other participants. Based on these illustrations, two participants were chosen based on the average behaviour to visualize the within-subject association between state compassion, state pro-environmental behaviour and peer influence over time. Microsoft Excel was used to create graphical illustrations of the fluctuations in the different variables over time and social situations for the chosen participants.

Several Linear Mixed Models (LMM) analyses with an autoregressive covariance (AR1) structure were conducted to examine state compassion, state pro-environmental behaviour, peer influence and the relationship of the three variables. First of all, it was tested whether participants differed in state compassion, state PEB, and peer influence compared to other participants to see if there is variability in the participants' mean scores. Therefore, three analyses were done: The first one with the PM scores of state compassion as the dependent variable and the participants' Identification Number (ID) as a fixed factor, the second with the PM scores of state PEB as the dependent variable, and ID as a fixed factor and the third one with the PM scores of peer influence as the dependent variable and ID as a fixed factor. Furthermore, the variable representing peer influence named "Others" was adjusted, so that a score of "0" reflects being alone in a situation and scores going up to 7 reflecting how much the other person was perceived to care for the environment. After that, two sets with four

LMM analyses each were done to investigate the mediation effect of compassion on the association between peer influence and PEB between subjects (PM) and also within-subjects (PMC). First, the main effect of peer influence on PEB was investigated with PEB as the dependent variable and peer influence as a predictor. Then, the effect of peer influence on compassion was examined, setting compassion as the dependent variable and peer influence as the predictor variable. After that, the influence of compassion on PEB was analyzed, setting PEB as the dependent variable and compassion as the predictor. Finally, the effect of compassion as a mediator was investigated by setting PEB as the dependent variable, peer influence as a predictor and compassion as a mediator. After these sets of LMM analyses, it was tested whether the mediation effect is significant using a Sobel test (Preacher & Leonardelli, 2001). The analyses were all two-tailed and significant at a p-value of $< .05$.

3. Results

Descriptive Statistics

After exclusion of incomplete data ($N = 12$), the final sample consisted of $N=33$ participants. The majority of the sample was female (70%) and stated to have German nationality (88%). Furthermore, all participants possessed at least a high school diploma. Table 1 provides a detailed overview of the characteristics of the participants.

Table 1

Overview of Participant Characteristics $N=33$

Variable	Category	Total Sample N(%)
Age, M (SD)	Years	26 (5.8)
Gender	Female	23 (70)
	Male	10 (30)
Nationality	German	29 (88)
	Dutch	1 (3)
	Other	3 (9)
Education	High School Diploma	12 (36.4)
	College Degree	4 (12.1)
	Vocational Training	1 (3)
	Bachelors Degree	8 (24.2)
	Masters Degree	6 (18.2)
	Professional Degree	2 (6.1)

State Compassion

The total sample was rather high in state compassion ($M = 6.25$, $SD = 0.72$) and the answers ranged from 3 to 7, with 7 reflecting the highest compassion score possible. LMM analysis revealed that the participants did not show variability in their state compassion scores, $F(1, 598) = 0.122$, $p = .73$. Figure 1 below visualizes this effect as most of the boxplots are black dots indicating that the participants did not vary at all in their compassion scores and the very few blue boxplots only range from 4 to 7.

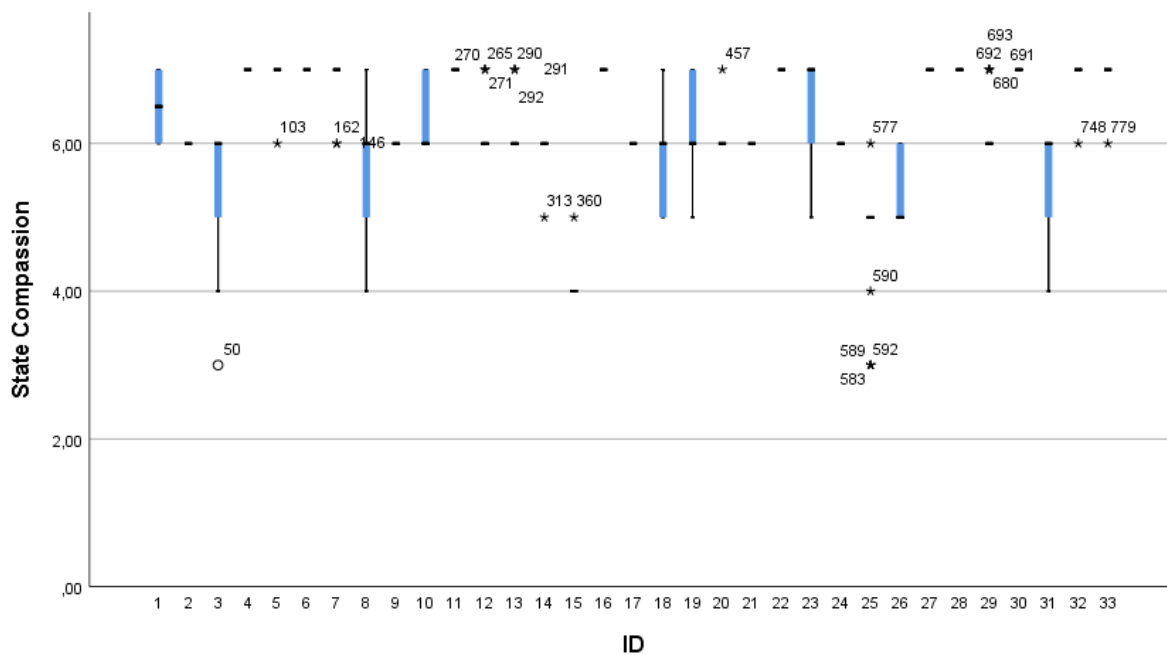


Figure 1 Boxplot depicting the variability of the state compassion scores for each participant

State Pro-Environmental Behaviour

The participants showed relatively high state pro-environmental behavior ($M = 5.45$, $SD = 0.94$) with a response range from 2.25 to 7. Furthermore, LMM analysis with the factor ID was found to have a significant fixed effect, $F(1, 602) = 7.488$, $p = .006$, which means the state pro-environmental behaviors differed significantly between individuals. This is visible in Figure 2 below as most of the boxplots are a blue line indicating that the participant's scores fluctuated over time.

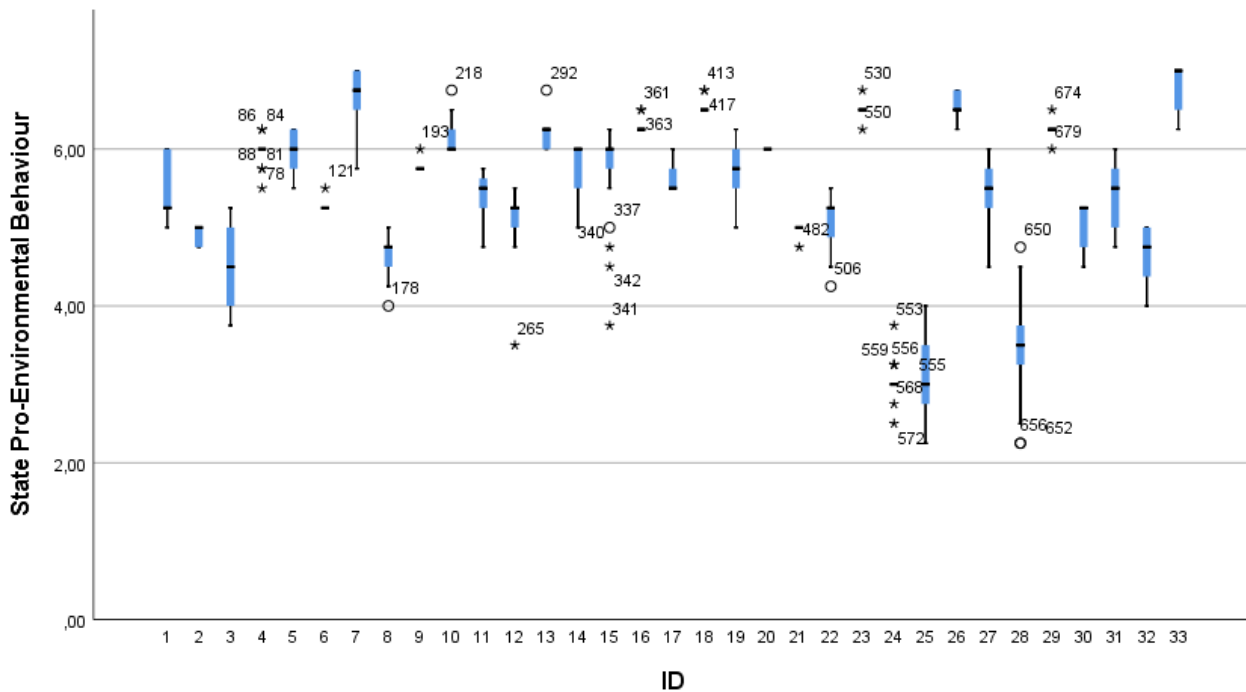


Figure 2 Boxplot depicting the variability of the state pro-environmental behaviour scores for each participant

Peer Influence

On average, participants had contact with persons that they perceived to care for the environment ($M = 5.21$, $SD = 1.08$). Furthermore, the response range was 1.8 to 6.76 indicating that every type of company, so contact with peers perceived to care about the environment, to be neutral or to not care about the environment was represented in the daily situations participants encountered during the study period. LMM analysis revealed that the participants did show variability in the perception they had about the persons they were with, $F(1, 598) = 10.125$, $p < .002$. Looking at Figure 3 below, the many blue and relatively long boxplots visualize this effect.

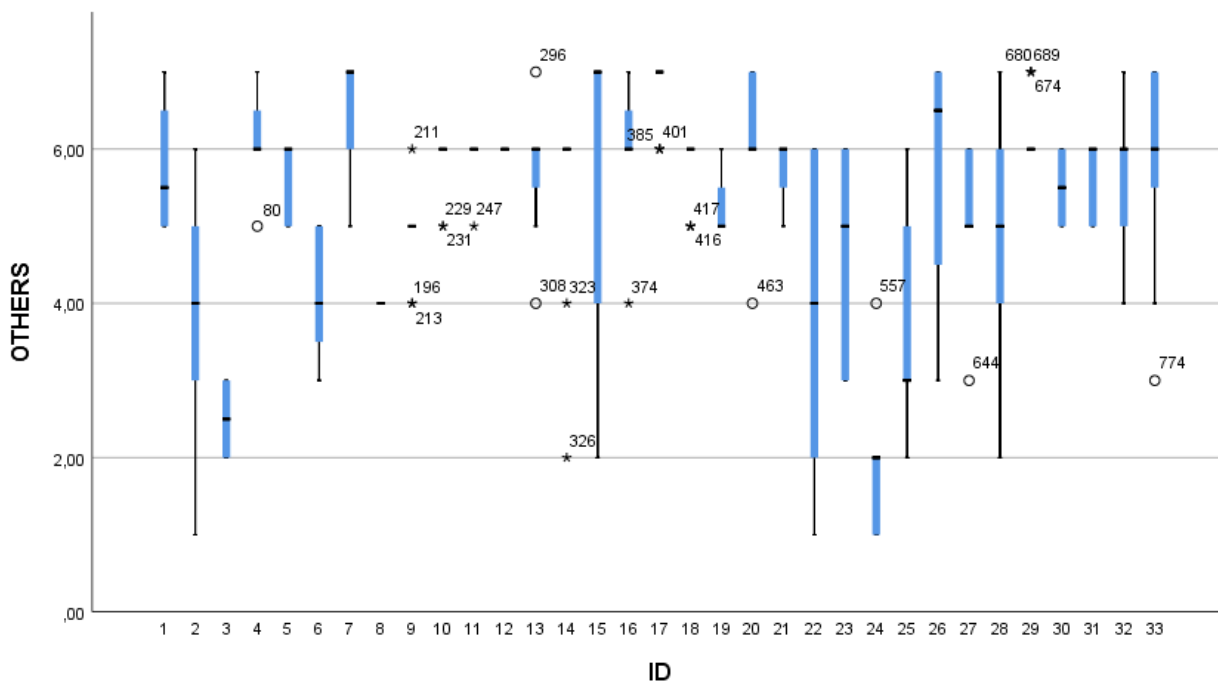


Figure 3 Boxplot depicting the variability of the perception each participant had about their company over the study period

Within-Subject Mediation Analysis

LMM analysis showed that the total effect (path *c*) of peer influence on state pro-environmental behavior was not significant, $F(1, 589.428) = 0.107, p = .74$. Furthermore, the effect of peer influence on compassion (path *a*) and the effect of state compassion on state pro-environmental behaviour (path *b*) were also not significant, $F(1, 591.869) = 0.263, p = .61$, and $F(1, 597.642) = 2.022, p = .16$, respectively. A Sobel test revealed that the mediation effect of state compassion on the association between peer influences and state pro-environmental behaviour was not significant ($z = 0.48, SE = 0.01, p = .63$).

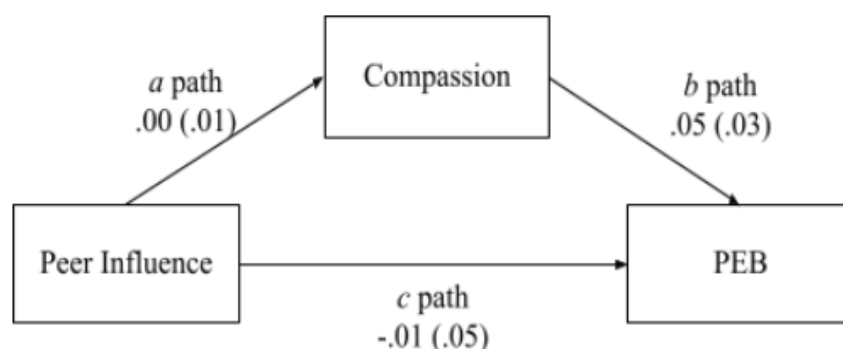


Figure 4. Mediation analysis of Peer Influence (IV), PEB (DV) and Compassion (M) with a, b, c indicating the respective paths with betas and standard errors; * $p < .05$.

Individual Cases for Visualization

The following two participants were chosen to visualize how the peer influence did not affect state compassion and state PEB as one of the participants had contact only to others caring for the environment and the other one had contact only to others not caring for the environment. Furthermore, they also represent the characteristics of the whole sample which was rather high in state compassion and state PEB and did not show much variability in state compassion scores.

Participant 4

Participant 4, is a 23 years old woman who stated to be German and possess a Bachelor's Degree at the time of the study. Her mean state compassion score was 5.41, and her scores ranged from 3 up to 6. Her levels of state compassion fluctuated over time to a greater extent than that of the whole sample and were generally relatively high. The state pro-environmental behaviour scores ranged from 3.7 to 5.3 with a mean score of 4.56, which is lower than that of the whole sample. It is visible through Figure 4 shown below that at the third time point with the lowest state of compassion, she also showed the lowest state of pro-environmental behaviour and had contact with a person whom she perceived to not care about PEB. However, the graph also shows that she never had contact with persons that she perceives to care about the environment and generally was most of the time alone as she only had company at 6 time points out of 24 time points measured.

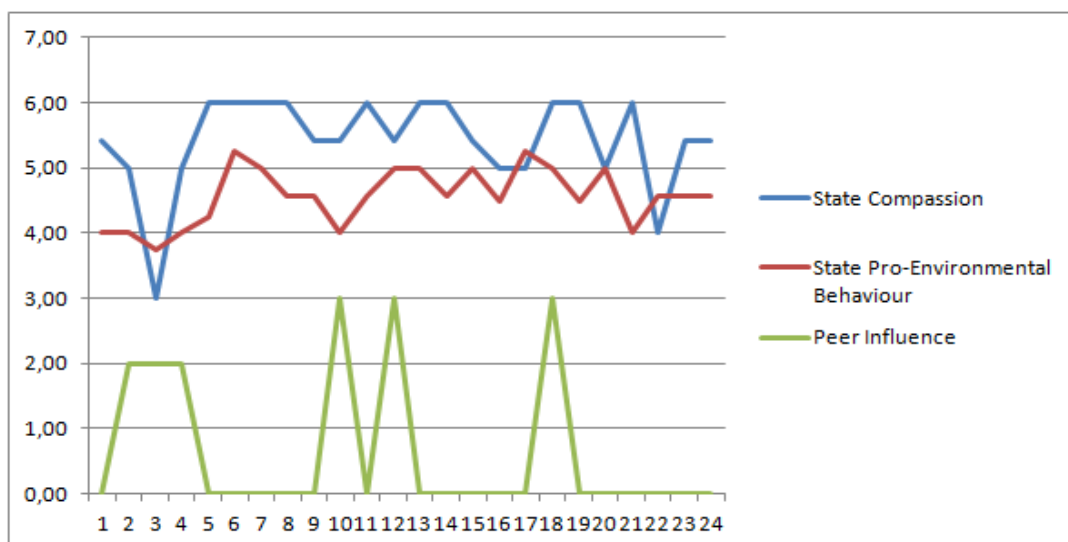


Figure 6 Graph showing Compassion, PEB, and Peer Influence of participant 4 for each time point

Participant 17

Participant 17 is a 40 years old woman that has German nationality and possesses a professional degree. Her mean state compassion score was 6.13, which is rather high on a possible scale of 1-7. However, she showed not much variability in her state compassion as her scores ranged only from 6 to 7. The mean state pro-environmental behaviour score was 6.14, her PEB levels also did not fluctuate much as her scores ranged from 5 to 7. During most measurement points, the participant contacted persons that she perceives to find pro-environmental behaviors important, and at the other time points, she was alone. This shows that she surrounds herself in contrast to participant 4 only with persons she perceives to care about PEB.

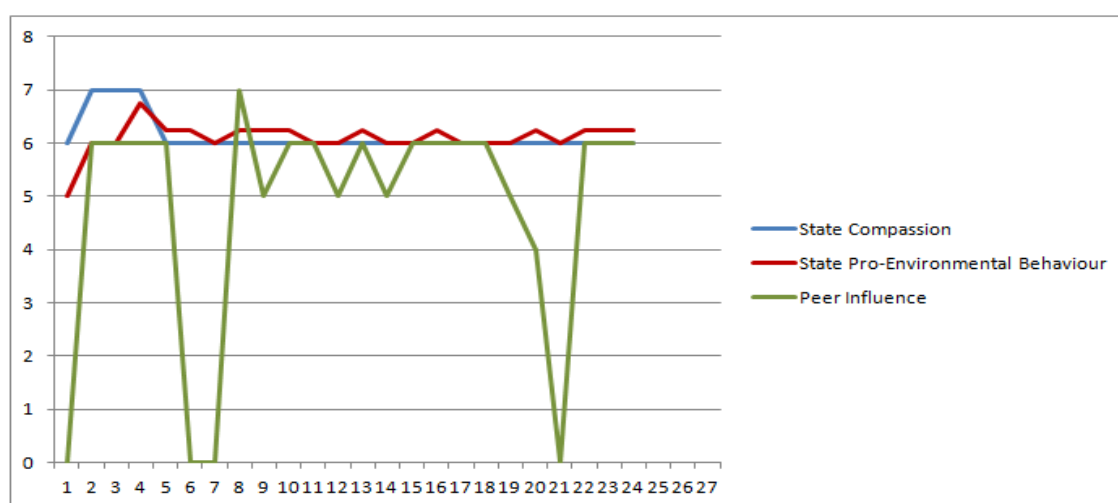


Figure 7 Graph showing Compassion, PEB, and Peer Influence of participant 17 for each time point

Discussion

The primary purpose of the current study was to investigate whether perceiving someone to care for the environment predicts pro-environmental behaviour in a specific situation and if compassion intervenes in this association as a mediator. Surprisingly, the perception of peers did not influence state pro-environmental behaviour and had also no effect on state compassion. Additionally, the level of state compassion did not influence state pro-environmental behaviour. Following the guidelines of Baron and Kenny (1986), no mediation

effect of state compassion on the association between peer influence and state PEB was found. Therefore, the hypothesis “*Being with someone perceived to care for the environment influences pro-environmental behaviour mediated by state compassion.*” is rejected.

The results of the current study are contradictory to findings of previous research in which peer influence and especially our perception of others’ social norms and values were found to influence prosocial behaviours as well as compassion (Culiberg, & Elgaaied-Gambier, 2016; Tajfel, Brown and Turner, 1979; Runyan, Fry, Steenbergh, Arbuckle, Dunbar, & Devers, 2019). The study of Seppälä et al. (2017) and the studies of Pfattheicher, Sassenrath, and Schindler (2016) in which connections between peer influences and compassion and a positive relation between compassion and pro-environmental behaviour was found led to the proposed hypothesis. A reason for these contradicting findings might be that past research mainly used cross-sectional data, so data measured at only one-time point assessing traits and general tendencies of individuals in contrast to the current study, which examined daily fluctuations of compassionate states and PEB. Furthermore, as past research used different study designs they also used different measurement tools, for example, Pfattheicher, Sassenrath, and Schindler (2016) used the full version of the Compassion Scale (Pommier, Neff, and Tóth-Király, 2019) in comparison to the single item used in this study. Due to the current study results, which did not replicate the found association between compassion and PEB, it can be assumed that the association is rather trait-based. However, a possible reason for the not found association between compassion and PEB might also be the missing variability of state compassion in individuals as well as the missing differences of average compassion between participants.

Another reason for these contradicting findings is that previous studies focused on one specific group of participants and mainly on adolescents and students (van Hoorn, Fuligni, Crone & Galvan, 2016; Ma, 2003) while the current study included all kinds of participants. For instance, participants' ages ranged from 18 to 40 years, and different professional degrees were represented. Most studies about peer influences and prosocial behaviours investigated adolescents or students because they are considered more vulnerable (Finn, Zimmermann, and Neyer, 2017; Kreniske, Spindler & Santelli, 2020). For instance, it is assumed by recent research that the influence of peers decreases after childhood and adolescence (Steinberg & Monahan, 2007). However, research about peer effects on older adults is scarce (Wrzus, Zimmermann, Mund & Neyer, 2017). The current study included all kinds of participants to increase the generalisability of the results, nevertheless, the influence of being with someone

perceived to care for the environment on PEB might have been found if the focus led only on adolescents or students.

Strengths, Limitations, and Future Research

One of the main strengths of the current study is the ESM design as it is the first study to assess the three constructs of peer influence, state compassion, and state pro-environmental behaviours in a real-time and real-life setting and by that contribute to the literature about antecedents of pro-environmental behaviours. Due to the Experience Sampling Method, the study provides unique insights into which factors influence or in this case do not influence individuals in specific situations. By that, biases like the recall bias are prevented, which is a threat to retrospective measures that ask participants to remember past situations or behaviours. Furthermore, the experience sampling method also increased construct, external and ecological validity by assessing naturally occurring experiences (Trull & Ebner-Priemer, 2009; Verhagen et al., 2016). Furthermore, compared to cross-sectional studies, with ESM it is possible to investigate within-person effects in addition to between-person effects. By this, situational effects influencing emotional states and behaviour can be captured, and meaningful conclusions can be drawn (Csikszentmihalyi, 2014). Another strength of the current study is the sample size, which was even higher than suggested by the guidelines of Conner and Lehman (2012), and the variability of the demographic characteristics of the participants. Moreover, the reliability of the four self-designed items measuring PEB was acceptable.

However, turning to the current study's limitations, the item to measure compassion might not have been chosen wisely. For instance, the item "*I like to be there for others in times of difficulties*" might represent a more general tendency of compassion of a person, so, measures compassion as a value or trait instead of compassion as an emotional state. Values are defined by Schwartz (1994) as "desirable trans-situational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity". As the focus of this study lies especially on detecting differences in varying social situations, it is crucial to use items measuring compassionate states in everyday life and not personal values. Thus, when the participants do not differ in their levels of compassion during the day, it is simply not possible to detect any effects of peer influence across different situations on compassion. Therefore, future research should follow the approach of Runyan, Fry, Steenbergh, Arbuckle, Dunbar, and Devers (2019) that used the four items of the CS with the highest factor loading and, based on these, calculated a mean state compassion score for each situation. By that, the

state compassion scores are based on more facets of compassion and are expected to vary across the day and situation. Furthermore, the four items measuring PEB included questions regarding meat consumption and means of transportation which were redundant for some participants as they followed a vegetarian/vegan diet or did not possess a car. For instance, although the items were statements like “To me, it is important to reduce my meat consumption” and it certainly is important for someone that follows a vegetarian or vegan diet, this statement is true the whole time and does not change during the day or social situation. Therefore, it increased the participants' burden as they had to answer questions every day that did not apply to their situation. As an alternative, the approach of Bessette (2011) could be used in future research. In his study, participants were asked once a day to report certain behaviours that they had performed during the day. The performed behaviours ranged from means of transportation, such as walking, biking, or using the car, to the time they spend online or watching television. By that, actual PEB is measured instead of assuming that because someone finds it important to reduce, for example, meat consumption, he/she is doing it. Moreover, participants were asked to take photographs of their recycling, the type of television, and many other aspects of daily life that impact the environment. Due to this, the measures do not rely on self-report but actual proof is provided. Using the two methods of Bessette (2011) it is also possible to investigate antecedents of specific behaviours and if peers influence certain types of PEB more than other types.

To address the other previously discussed factors that might have led to different results, future research about the effect of peer influences on compassion and PEB could focus on specific age groups (Wrzus, Zimmermann, Mund & Neyer, 2017). For instance, it would be interesting to investigate peer effects on the association between compassion and PEB in older adults as the literature on this specific age group is rare, and much remains unknown. Moreover, another aspect of peer influence that was not covered in the current study but might have influenced the results differently is the closeness of the relationship between the participant and their company. Peer influences are stronger the closer the relationship is with someone. For instance, past research has found that a “best friend” of a person is uniquely influential and plays a crucial role in the maintenance of a certain behaviour (Morgan & Grube, 1991; Urberg, 1992). So, situations in which participants were with their closest friends can be considered as more influential than situations in which they were with less close peers (Collado, Evans & Sorrel, 2017). This means that situations with the company of a "best friend" weigh more regarding behaviours and thus must be taken into account in the analysis differently. Future research might take the closeness of the relationship

into account and should ask for the type of relationship or how close the relationship is perceived by the participants.

Implications and Conclusion

The current study contributes to the growing literature body of pro-environmental behaviour and its antecedents. For instance, the null findings indicate that the occurrence and likelihood of pro-environmental behaviours cannot be explained by effects of peer influence and levels of state compassion in an individual in a specific situation. However, due to the above-mentioned limitations of the current study, no pertinent conclusions can be drawn and more research in this field is needed. The current study provided a starting point in examining the relationships between the three constructs of peer influence, compassion and PEB, and showed the importance of using items measuring state variables instead of values or trait variables.

In conclusion, the need to act pro-environmental is urgent, and since the big decision-makers operate very slowly, private households and individuals have to act. In order to support and persuade individuals to behave pro-environmental in their daily lives, possible antecedents of PEB have to be investigated in a real-life setting. Therefore, this ESM study further examined how compassion mediates the association between peer influence and PEB in everyday situations. Although how we perceive the persons we surround ourselves with was not found to predict higher state pro-environmental behaviour as well as state compassion, and by that replicate previous findings, it revealed the need to develop appropriate items for future ESM studies in this field. All in all, humans caused the environmental issues we are facing today. However, we are also the solution, and every little step into understanding how this can be achieved is a step into a sanguine future.

References

- Allen, J. B., & Ferrand, J. L. (1999). Environmental locus of control, sympathy, and proenvironmental behavior: A test of Geller's actively caring hypothesis. *Environment and Behavior*, 31(3), 338-353. Doi: 10.1177/00139169921972137
- Bessette, D. L. (2011). *The Experience Sampling Method, Apple iPhones, and Investigating the Relationship Between Values, Subjective Well-being and Pro-environmental Behavior*. Michigan State University. Community, Agriculture, Recreation and Resource Studies.
- Boruah, A. (2016). Positive impacts of peer pressure: A systematic review. *Indian Journal of Positive Psychology*, 7(1), 127. Doi: 10.15614/ijpp%2F2016%2Fv7i1%2F12370
- Brown, K., Adger, W. N., Devine-Wright, P., Anderies, J. M., Barr, S., Bousquet, F., Butler, C., Evans, L., Marshall, N., & Quinn, T. (2019). Empathy, place and identity interactions for sustainability. *Global Environmental Change*, 56, 11–17. Doi: 10.1016/j.gloenvcha.2019.03.003
- Chen, M. F., & Tung, P. J. (2010). The moderating effect of perceived lack of facilities on consumers' recycling intentions. *Environment and Behavior*, 42(6), 824-844. Doi: 10.1177/001391650935283
- Cialdini, R. B., & Trost, M. R. (1998). Social influence: Social norms, conformity and compliance. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (pp. 151–192). McGraw-Hill.
- Collado, S., Evans, G. W., & Sorrel, M. A. (2017). The role of parents and best friends in children's pro-environmentalism: Differences according to age and gender. *Journal of Environmental Psychology*, 54, 27-37. Doi: 10.1016/j.jenvp.2017.09.007
- Conner, T. S., & Lehman, B. J. (2012). Getting started: Launching a study in daily life. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 89–107). The Guilford Press.
- Costello, B. J., & Zozula, C. (2018). Peer influence: Mechanisms and motivations. *Deviant Behavior*, 39(1), 94-110. Doi: 10.1080/01639625.2016.1260387
- Finn, C., Zimmermann, J., & Neyer, F. J. (2017). Personality development in close relationships. In *Personality development across the lifespan* (pp. 357-369). Academic Press. Doi: 10.1016/B978-0-12-804674-6.00022-3
- George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference*. 11.0 update (4th ed.). Boston: Allyn & Bacon.
- Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro-

- environmental concern and behaviour: A review. *International journal of psychology*, 49(3), 141-157. Doi: 10.1002/ijop.12034
- Gilbert, P. (Ed.). (2005). *Compassion: Conceptualisations, research and use in psychotherapy*. Routledge.
- Goetz, J. L., Keltner, D., & Simon-Thomas, E. (2010). Compassion: an evolutionary analysis and empirical review. *Psychological bulletin*, 136(3), 351. doi: 10.1037/a0018807
- Goetz, J. L., et al. (2017). The landscape of compassion: Definitions and scientific approaches. *The Oxford handbook of compassion science*, 3-15.
- Jambeck JR, et al. (2015) Marine pollution. Plastic waste inputs from land into the ocean. *Science* **347**:768–771. Doi: 10.1126/science.1260352
- Kang, J., Liu, C., & Kim, S. H. (2013). Environmentally sustainable textile and apparel consumption: the role of consumer knowledge, perceived consumer effectiveness and perceived personal relevance. *International Journal of consumer studies*, 37(4), 442-452. Doi: 10.1111/ijcs.12013
- Karp, D. G. (1996). Values and their effect on pro-environmental behavior. *Environment and behavior*, 28(1), 111-133. doi: 10.1177/0013916596281006
- Lutz, A., Brefczynski-Lewis, J., Johnstone, T., & Davidson, R. J. (2008). Regulation of the neural circuitry of emotion by compassion meditation: effects of meditative expertise. *PloS one*, 3(3), e1897. Doi: 10.1371/journal.pone.0001897
- Ma, H. K. (2003). The relationship of the family social environment, peer influences, and peer relationships to altruistic orientation in Chinese children. *The Journal of genetic psychology*, 164(3), 267-274 Doi: 10.1080/00221320309597983
- Markle, G. L. (2013). Pro-environmental behavior: does it matter how it's measured? Development and validation of the pro-environmental behavior scale (PEBS). *Human ecology*, 41(6), 905-914 Doi: 10.1007/s10745-013-9614-8
- Morgan, M., & Grube, J. W. (1991). Closeness and peer group influence. *British Journal of Social Psychology*, 30(2), 159-169. 10.1111/j.2044-8309.1991.tb00933.x
- Park, C. W., & Lessig, V. P. (1977). Students and housewives: Differences in susceptibility to reference group influence. *Journal of consumer Research*, 4(2), 102-110. Doi: 10.1086/208685
- Pfattheicher, S., Sassenrath, C., & Schindler, S. (2016). Feelings for the suffering of others and the environment: Compassion fosters proenvironmental tendencies. *Environment and Behavior*, 48(7), 929-945. Doi: 10.1177/0013916515574549
- Penner, L. A., Dovidio, J. F., Piliavin, J. A., & Schroeder, D. A. (2005). Prosocial behavior:

- Multilevel perspectives. *Annu. Rev. Psychol.*, 56, 365-392. Doi: 10.1146/annurev.psych.56.091103.070141
- Pommier, E., Neff, K. D., & Tóth-Király, I. (In Press, Accepted: 13 August 2019). The Development and Validation of the Compassion Scale. Assessment. DOI: 10.1177/1073191119874108
- Preacher, K. J., & Leonardelli, G. J. (2001). Calculation for the Sobel test. Retrieved July, 10, 2021.
- Prinstein, M. J., & Dodge, K. A. (Eds.). (2008). *Understanding peer influence in children and adolescents*. Guilford Press.
- Runyan, J. D., Fry, B. N., Steenbergh, T. A., Arbuckle, N. L., Dunbar, K., & Devers, E. E. (2019). Using experience sampling to examine links between compassion, eudaimonia, and prosocial behavior. *Journal of Personality*, 87(3), 690–701. Doi: 10.1111/jopy.12426
- Seppälä, E. M., Simon-Thomas, E., Brown, S. L., Worline, M. C., Cameron, C. D., & Doty, J. R. (Eds.). (2017). *The Oxford handbook of compassion science*. Oxford University Press
- Sprecher, S., Fehr, B., & Zimmerman, C. (2007). Expectation for mood enhancement as a result of helping: The effects of gender and compassionate love. *Sex roles*, 56(7), 543 - 549. Doi: 10.1007/s11199-007-9192-6
- Steinberg, L., & Monahan, K. C. (2007). Age differences in resistance to peer influence. *Developmental psychology*, 43(6), 1531. Doi: 10.1037/0012-1649.43.6.1531
- Stern, P. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of social issues*, 56(3), 407-424. doi: 10.1111/0022-4537.00175
- Stern, P., Dietz, T., Abel, T., Guagnano, G., & Kalof, L. (1999). A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmentalism. *Human Ecology Review*, 6(2), 81-97. Retrieved March 5, 2021, from <http://www.jstor.org/stable/24707060>
- Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of social issues*, 50(3), 65-84.
- Stern, P. C., Kalof, L., Dietz, T., & Guagnano, G. A. (1995). Values, beliefs, and proenvironmental action: Attitude formation toward emergent attitude objects 1. *Journal of applied social psychology*, 25(18), 1611-1636. Doi: 10.1111/j.1559-1816.1995.tb02636.x
- Suki, N. M., & Suki, N. M. (2019). Examination of peer influence as a moderator and

- predictor in explaining green purchase behaviour in a developing country. *Journal of Cleaner Production*, 228, 833-844. Doi: 10.1016/j.jclepro.2019.04.218
- Thøgersen, J. (2008). Social norms and cooperation in real-life social dilemmas. *Journal of economic psychology*, 29(4), 458-472. Doi: 10.1016/j.joep.2007.12.004
- Turner, J. C., Brown, R. J., & Tajfel, H. (1979). Social comparison and group interest in ingroup favouritism. *European journal of social psychology*, 9(2), 187-204. Doi: 10.1002/ejsp.2420090207
- Urberg, K. A. (1992). Locus of peer influence: Social crowd and best friend. *Journal of Youth and Adolescence*, 21(4), 439-450.
- van Hoorn, J., Fuligni, A. J., Crone, E. A., & Galvan, A. (2016). Peer influence effects on risk-taking and prosocial decision-making in adolescence: Insights from neuroimaging studies. *Current Opinion in Behavioral Sciences*, 10, 59-64. Doi: 10.1016/j.cobeha.2016.05.007
- Wolske, K. S., Gillingham, K. T., & Schultz, P. W. (2020). Peer influence on household energy behaviours. *Nature Energy*, 5(3), 202-212. Doi: 10.1038/s41560-019-0541-9
- Wrzus, C., Zimmermann, J., Mund, M., & Neyer, F. J. (2017). Friendships in young and middle adulthood: Normative patterns and personality differences. In M. Hojjat & A. Moyer (Eds.), *Psychology of friendship* (pp. nn). New York: Oxford University Press.

Appendix

Invitation Letter

Dear [add name]

This is an invitation to participate in a research study about **compassion** and **environmental behaviors**. This study will be conducted by students from the Faculty of Behavioural, Management and Social Sciences at the University of Twente as part of their bachelor and master thesis.

To participate in the study, you need to be 18 years or older, you need to have good English proficiency, and you need to have access to a mobile device with an internet connection. The study will run using the program Ethica and downloading the Ethica app is essential for participation.

The study will run for 9 days. On the first day you need to give informed consent and answer some questions about your demographics. Three times a day (9.00 - 12.00h, 14.00 - 17.00h and 19.00 - 22.00h) you will be notified to answer some short questions for 8 consecutive days. This will take about 5 minutes per questionnaire. On the ninth and last day of this study you will be notified to complete the long forms of the daily questionnaires. This will take about 20 minutes. Every day you will receive reminders to complete the questionnaires.

Participation in the study is entirely voluntary. You can withdraw from the study at any time, without having to give a reason.

Your answers in the study will be confidential. All data are collected anonymously as directly identifying information will not be obtained.

Are you interested to participate in the study? Go to: <https://ethicadata.com/study/1740/> and sign up. The study registration code is: **1740**

Sincerely,

[add your name]