



BACHELOR THESIS

The Mediating Effect of Affective States on
Compassion and Pro-Environmental
Behaviours in Everyday Life

An Experience Sampling Study

Author: Meron Makonnen

Faculty of Behavioural, Management and Social Sciences (BMS)

Department of Positive Clinical Psychology & Technology

First Supervisor: Mirjam Radstaak

Second Supervisor: Menno de Jong

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UNIVERSITY OF TWENTE.

Abstract

Background. Compassion has been found to elicit prosocial behaviours. Recent research has been studying compassion for the suffering of others in relation to pro-environmental behaviours (PEB). Although this relationship has been established it remains unclear how compassion exactly elicits pro-environmental behaviours. According to the emotion literature, compassion can be understood as eliciting positive and negative affective states in a person whereby the precise emotional response remains arbitrary. The present study aims to examine the mediating effect of negative and positive affective states on the established relationship between compassion and PEB in the daily context.

Method. Experience sampling method (ESM) is a self-report data collection approach whereby questions are answered multiple times per day in the context of one's daily life. It was used for nine consecutive days among 41 participants to answer questions about their PEB, positive and negative affective states and compassion for other humans.

Results. A series of Linear Mixed Model (LMM) analyses were conducted. Positive affect CI [-0.03, .02] and negative affect CI [-0.03, .10] did not mediate the association between compassion and PEB. However, distress predicts PEB, $t(578.37) = -2.01, p = .04, CI [-0.04, -.0005]$.

Conclusion. The study facilitated a better comprehension of individual-level factors determining PEB by considering the neglected influence of emotions on the relationship between daily state compassion and daily state PEB. Hereby, it was found that distress influences PEB negatively.

Keywords: compassion, pro-environmental behaviours, affect, emotions, distress, enthusiasm

The Mediating Effect of Affective States Compassion and Pro-Environmental Behaviours in Daily Life

There is a growing awareness that individuals' behaviours contribute to environmental problems such as global warming, desertification and water pollution (de Groot & Steg, 2009). Therefore, pro-environmental behaviours have been increasingly promoted on an individual level in the past years to motivate each person but also the collective, to rehabilitate and prevent further damage to nature (Coelho et al., 2017). Pro-environmental behaviour (PEB) can be understood as all behaviours which result in the conservation and preservation of the environment (Axelrod & Lehman, 1993). Additionally, Stern (2000, p. 408) defined environmental behaviour by its impact: "the extent to which it changes the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere itself.

However, the promotion faces a common problem: the desired environmental behaviour is experienced as more effortful, unpleasant and costly whereas the undesired, environmentally unfriendly behaviour is experienced as more convenient, easier and rewarding (Shiota et al., 2021). This evaluation makes it unlikely for individuals to reduce their impacts on the environment and in order to promote PEB more effectively research has been focusing on understanding what factors are associated with individuals' engagements in environmental behaviours (McKenzie-Mohr et al., 1995). One approach in understanding these factors are other-orientated tendencies which aim at shifting the attention away from the self to foster PEB in individuals for reasons outside oneself (Zelenski & Desrochers, 2021). Psychological research has successfully identified the relationship between other-orientated tendencies such as empathy with helping behaviours towards another person (Batavia et al., 2020; Pfattheicher et al., 2016; Singer & Klimecki, 2014; Tam, 2013). Empathy refers to the general capacity to share another's

positive and negative emotional states which evokes a sense of concern for the other's wellbeing (Batavia et al., 2020; Pfattheicher et al., 2016; Singer & Klimecki, 2014). It is a broad term referring to a range of positive and negative caring emotions, including aspects like emotional sharing, perspective-taking, and compassion for the suffering of others (Pfattheicher et al., 2016).

Utilizing this knowledge, environmental psychologists have been increasingly considering empathy in helping nature i.e., by adopting PEB (Batavia et al., 2020; Berenguer, 2007, 2010; Pfattheicher et al., 2016; Schultz, 2000, 2001; Tam, 2013). Sevillano et al. (2007) showed that taking the perspective of animals suffering due to pollution while seeing images of them resulted in increased concerns for the whole biosphere. Berenguer (2007) found that induced empathy with nature through perspective-taking can translate into actual behaviour. People who were instructed to empathize with a suffering tree or a bird donated more money to an environmental cause as they were more compelled to help animals and nature than those who were not in the empathy condition. Additionally, Tam (2013) argued that the dispositional tendency to empathize with nature is associated with pro-environmental behaviours. Taken together, both induced empathy through perspective-taking and dispositional empathy toward nature motivates engagement in PEB (Tam, 2013).

Compassion

Compassion, an other-orientated tendency, has received less research attention in relation to pro-environmental behaviour than empathy (Batavia et al., 2020; Pfattheicher et al., 2016).

Compassion can be understood as “the feeling that arises in witnessing another's suffering and that motivates a subsequent desire to help” (Goetz et al., 2010, p.2). In contrast to empathy, it is not a *'shared'* suffering, rather the person experiences feelings of concern, warmth, and care

for the other person, animal or thing, as well as the desire to alleviate the suffering (Singer & Klimecki, 2014). However, it must be noted that terms such as ‘empathy’, ‘empathic concern’, ‘sympathy’ and ‘pity’ are commonly used to refer to compassion as the clear differentiation between the concepts is difficult (Goetz et al., 2010; Pfattheicher et al., 2016; Singer & Klimecki, 2014).

The desire to help and reduce suffering are important aspects of compassion. In fact, there is a vast body of evidence outlining that compassion increases altruistic, prosocial, donation, and helping behaviours (Eisenberg & Miller, 1987; Greving & Kimmerle, 2020; Sassenrath et al., 2017). Consequently, compassion is a prosocial action tendency and has been related to a concern for humanity, nature and animals (Pfattheicher et al., 2016). Pfattheicher et al. (2016) found that compassion for humans predicts pro-environmental behavioural intentions. Moreover, Greving and Kimmerle (2021) showed that compassion increases behavioural intentions to protect wildlife. Given these positive effects of compassion for humans, nature and animals, the question arises: Why does compassion elicit PEB?

Affect

Human behaviour takes place in the context of emotions, meaning that a person’s behaviours are significantly influenced by how they are feeling (Carrus et al., 2008). Emotions can be understood as short-lived, physiological responses to a specific stimulus. They can be classified as negative, positive, primary, or secondary and although there are disagreements about their clear classification, emotions like joy, happiness, sadness, anger, or fear influence how an individual interacts with its environment as it guides one’s action tendencies, way of reasoning and thinking (Coelho et al., 2017; Koenig-Lewis et al., 2014). The terms ‘emotion’ and ‘affect’

are commonly used interchangeably (Coelho et al., 2016; Koenig-Lewis et al., 2014) as also in this study.

Emotions clearly relate to prosocial behaviours like PEB (Bissing-Olson et al., 2013; Harth et al., 2013; Koenig-Lewis et al., 2014). Various studies have shown that feeling relaxed or happy predicts prosocial behaviours such as donating money to charity, time spent helping others, and giving blood (Bissing-Olson, 2015). Nonetheless, the influence of emotions on PEB has not been studied extensively (Bissing-Olson et al., 2013, 2016; Carrus et al., 2008; Coelho et al., 2017; Harth et al., 2013; Hartmann et al., 2005; Koenig-Lewis et al., 2014). The sparse research interested in the relationship between affect and PEB has been primarily on trait affect, investigating dispositional differences in the extent persons experience various affective states over time (Coelho et al., 2017). Little work has been done on state affect, meaning how momentary, day-to-day affective experiences relate to daily PEB (e.g., Bissing-Olson et al., 2016; Bissing-Olson et al., 2013). However, research about the day-to-day relationship between affect and pro-environmental behaviour is important because it provides evidence of the relationship in the rich contexts of people's real-life behaviours (Bissing-Olson, 2015; Myin-Germeys et al., 2018). Hence, capturing an individual's varying affective states in relation to PEB enables researchers to design environmental interventions more effectively by taking an individual's daily fluctuations into account. Thus, the present research aims at fillings this knowledge gap.

Compassion and Affect

As established, positive, pleasant emotions relate to pro-environmental behaviour (Zelenski & Desrochers, 2021). But how does a person feel whose pro-environmental behaviour

was elicited by compassion? The emotion literature has been unclear about this question. Some argue that compassion is experienced as a negative affective state as humans have the general tendency to mirror the emotional expressions they observe in the outside world. As compassion is elicited in response to the observation of a negative event (i.e., the suffering of others) the perceived unpleasant emotions in the sufferer are mirrored in oneself. For example, when seeing malnourished children, crying babies or homeless people their unpleasant affective emotions are mirrored in the compassionate person. Thus, being in a compassionate state elicits a negative emotional state (Goetz et al., 2010). Others argue that compassion is experienced as a positive affective state (Goetz et al., 2010; Shaver et al., 1987). They say, that the person experiences feelings of warmth, tenderness, and care for the suffering person (Goetz, 2010; Singer & Klimecki, 2014). As such, compassion elicits positive, ‘heart-warming’ emotions (Condo & Barrett, 2013).

Condo & Barrett (2013) experimentally studied the emotional valance of compassion. They divided people into a neutral or compassion induction and let them rate similarities between emotion-related adjectives. Afterwards, participants rated their own affective state in response to the induction. They found that compassion is experienced as a pleasant state following neutral inductions and unpleasant following the compassion induction. Thus, a negative affective state seems to be experienced in response to compassionate feelings in the laboratory setting. This does not imply that compassion elicits the same affective response in daily life and as Condon & Barrett (2013) recommended the affective conceptualization of compassion needs to be examined in different contexts.

Present study

The relationship between compassion and PEB has been established in earlier studies however, the influence of daily affective states has not been studied. Therefore, the present thesis is aiming to fill the knowledge gap by studying the relationship between state compassion and state pro-environmental behaviours in consideration of both positive and negative state affect. More specifically, the thesis centres on the question of ‘How do daily variations in state affect relate to daily variations in state pro-environmental behaviours and state compassion?’ It is hypothesized that positive and negative state affect mediate the effect of state compassion on state pro-environmental behaviours. Positive affect mediates the effect of state compassion on state pro-environmental behaviours because activated positive affect (feelings at a high level of activation such as excitement and enthusiasm) has a strong motivational potential for positive approach behaviours such as PEB (Bissing-Olson, 2015; Fredrickson, 1998, 2001). Based on Fredrickson’s Broaden-and-Build Model of Positive Emotions (1998, 2001) positive approach behaviours that require more energy and personal initiative, such as PEB, are initiated as the emotion expands an individual’s thought and action repertoires. Negative affect mediates the effect of state compassion on state pro-environmental behaviours because of conceptual reasons. As previously described, compassion is experienced as a response to the mirrored suffering of another in oneself. Hereby, it is most commonly understood as being experienced as distress as humans are biologically more wired to be evoked by it (Tam, 2013).

The present paper aims to investigate both the direct and indirect influences of state compassion on PEB through the affect states of state enthusiasm and state distress in the daily context. For this purpose, experience sampling method (ESM), also known as ecological

momentary assessment (ESM), is applied as a structured self-report diary technique rooted in ecological psychology to capture an individual's situated behaviour (Myin-Germeys et al, 2018).

Method

Design

The present study was part of a larger study examining the relationship between compassion for humans and pro-environmental behaviours. The aim of the present study was to analyse the effect of daily positive and negative affect on the relationship between compassion and pro-environmental behaviours. The independent variable was compassion. The dependent variable was the amount of pro-environmental behaviours (PEB) and affect with two levels (positive and negative) was hypothesized to be a mediating variable.

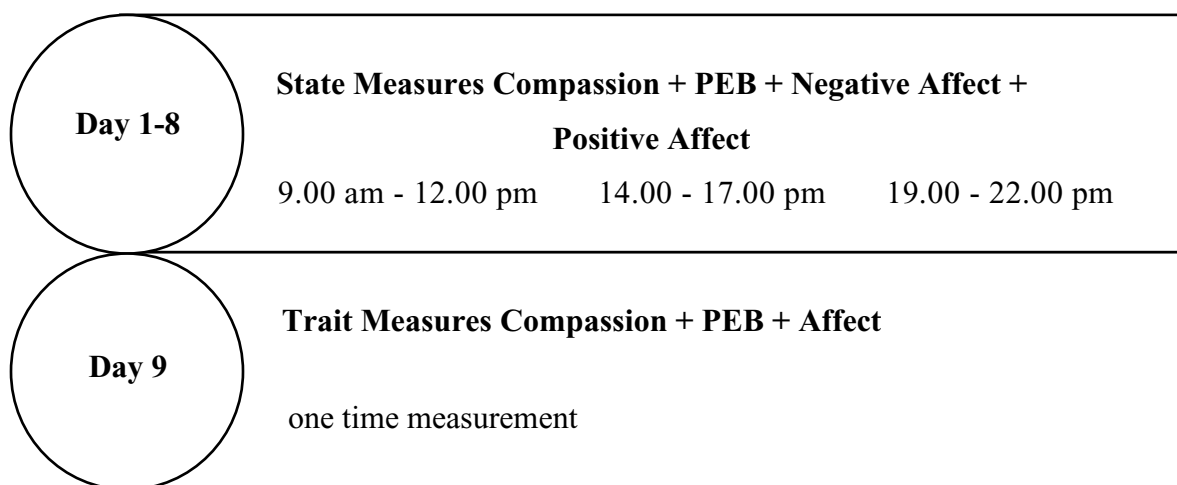
This quantitative study with a repeated measures design was conducted with the experience sampling method (ESM). ESM is a data collection approach that collects participants self-report data multiple times per day and at the moment it occurs in order to give insights into a person's daily experiences. Participants are notified via their smartphone devices to answer short, identical sets of questions and as the answers are given during the participant's daily life, ESM provides insights into individuals' experiences, behaviours and emotions in a natural setting (Van Berkel et al., 2018). Usually, ESM studies with multiple measurements per day have a duration of three days to three weeks (Conner & Lehman, 2012). This is very different from cross-sectional study designs where data is only collected retrospectively or beforehand at one point in time. The experience sampling method was chosen as it enables to study participants' pro-environmental behaviours, compassion and affect (positive and negative) in the context of their

daily lives. This makes it possible to study an individual's natural variability in these variables over the course of time.

The duration of this ESM study was nine days. The design of the data collection is displayed in Figure 1. On day one to eight participants answered the same state questions three times per day. The state questions consisted of four items for PEB, and one item each for compassion, positive affect and negative affect. The items were answered in the Ethica application according to an interval contingent trigger. As such, participants could answer the questions within predefined time intervals with standardized time gaps between triggers (Van Berkel et al., 2018). On day nine the participants answered the corresponding trait questionnaires once by filling out the Pro-Environmental Behaviour Scale (PEBS), the Compassion Scale (CS) and the Positive and Negative Affect Scale (PANAS). The answers from the trait questionnaires were not used in this study.

Figure 1

Study Layout of ESM Study



Participants

Forty-one participants were gathered through convenience sampling by the four researchers' personal contacts. Each researcher recruited five to ten participants. The inclusion criteria were (1) to be at least 18 years or older, (2) to have a good comprehension of the English language, and (3) to have access to a mobile device (Android or IOS) with an internet connection to download the Ethica application.

The initial sample size decreased to 31 participants as ten persons were excluded as they missed 50% or more of the state measurements over the 8 days. The exclusion was based on Conner & Lehman's (2012) recommendation to use a cut-off point of having completed at least 50% of the measurements to prevent that statistical conclusions are misled by differences between study-compliant and non-compliant participants. Further analyses were completed with 31 participants which is sufficient for an ESM study (Van Berkel et al., 2018).

Materials

Questionnaires

State Pro-Environmental Behaviour. The daily measurements of PEB were based on the Pro-Environmental Behaviour Scale (PEBS) (Markle, 2013). The scale consists of four subscales: conservation (e.g., 'How often do you turn off the lights when leaving a room?'), food (e.g., 'During the past year have you decreased the amount of beef you consume'), environmental citizenship (e.g., 'Are you currently a member of any environmental, conservation, or wildlife protection group?') and transportation (e.g., 'During the past year how often have you car-pooled?'). The four daily PEB items were self-designed based on these scales. Items were 'To me it is important to limit my energy use.', 'To me it is important to limit

my meat consumption.’, ‘To me it is important to talk to others about their environmental behaviors.’ and ‘To me it is important to limit my use of the car’. Participants filled out to what extent they agreed with each statement on a 7-point Likert-Scale, ranging from 1 (totally disagree) to 7 (totally agree).

State Compassion. The daily measurement of Compassion was chosen from the Compassion Scale (CS) (Pommier et al., 2020). The scale consists of four subscales, namely mindfulness, experienced kindness, lessened indifference, and a sense of common humanity. The questionnaire was found to represent a general factor of compassion for others (Pommier et al., 2020) and as compassion for humans is strongly correlated with compassion for nature, the item was chosen (Batavia et al., 2020, Pfattheicher, 2016; Tam, 2013). More precisely, the item ‘I like to be there for others in times of difficulty’ was included. Participants filled out to what extent they agreed with each statement on a 7-point Likert-Scale, ranging from 1 (totally disagree) to 7 (totally agree).

State Affect. The daily measurements of positive and negative affect were chosen from the Positive and Negative Affect Scale (PANAS) as it is the most commonly used questionnaire to measure emotions and affect (Watson et al., 1988). Hereby, do the items referring to PA reflect how much a person feels active, alert, and enthusiastic. This means that a high score on PA means that a person is energetic, pleurably engaged and fully concentrated, whereas low PA reflect lethargy and sadness. The items on NA measure unpleasurable engagement and subjective distress, whereby low NA indicates a state of calmness (Watson et al., 1988). The questionnaire is designed in a manner that enables measuring affect at various points in time such as the present day, past day, week, year, or in general (Watson et al., 1988). In this study, the item was made to a state item by using the present tense. The item ‘I am distressed right now’

for NA and the item ‘I am enthusiastic right now’ for PA were chosen. Participants filled out to what extent they agreed with each statement on a 7-point Likert-Scale, ranging from 1 (totally disagree) to 7 (totally agree).

Procedure

The data collection was started and conducted throughout the month of April. Participants were recruited via an invitation letter (see Appendix) which informed them briefly about the aim, nine-day duration, and procedure of the study. Participation was completely voluntary and did not include any incentives. Participants were able to subscribe to the study via the URL subscription link provided in the invitation letter. The Ethica application was used as the environment for the study (Ethica, 2021). Ethica was set with a time-based triggering mechanism three times a day reminding the participants to answer the state questions. To complete the questions participants have a time window of 2 hours. The state questions asked about participants state PEB, compassion, enthusiasm, and distress as well as about the other researchers’ variables: mindfulness, nature connectedness, being outdoors and being with others who care about the environment. The scales used by the other researchers were from the Mindfulness Attention Awareness Scale (Brown & Ryan, 2003) and the Connectedness to Nature Scale (Mayer & Frantz, 2004).

The day before the start of the ESM study, participants registered and logged into the Ethica application with a valid email address and password. Each person needed to sign an informed consent, encompassing voluntary participation and the possibility to withdrawal at any time without giving a reason. Then, they answered some demographical questions regarding their age, nationality, and gender. In the following consecutive eight days, the ESM study took

place where participants responded to the state questions three times a day, namely at 9.00 - 12.00h, 14.00 - 17.00h and 19.00 - 22.00h. Thus, the participants were asked to respond 24 times. This took approximately 5 minutes per time interval. When the participant did not answer the questions at a certain timepoint a reminder was scheduled once after 30 minutes and once after an hour. The questionnaire items for each timepoint expired after 90 minutes of being unanswered. On the last day, participants were notified to complete the three trait questionnaires: the 19-item Pro-Environmental Behaviour Scale (PEBS) (Markle, 2013), the 16-item Compassion Scale (CS) (Pommier et al., 2020) and the 20-item Positive and Negative Affect Scale (PANAS) (Watson et al., 1988), which took approximately 20 minutes. The trait questionnaires were not part of the present study.

Data Analysis

The data was exported from Ethica and transformed into an SPSS-dataset. For all statistical analyses, IBM SPSS Statistics Version 25 was used. All participants with a response rate of at least 50% of the state measurements over the 8 days were included in the data analysis. First, Little's MCAR test was conducted to see whether the sample's data were missing completely at random or whether there was a pattern behind the missingness. Further, Person means (PM) and person mean-centred scores (PM-centred) for state PEB, state compassion, state NA and PA were computed. This was done as PM scores indicate the average of each study variable per participant across all 24 timepoints which allows for between-person analyses (BS). PM-centred scores show momentary deviations in state PEB, state compassion, and state NA and PA of all participants per timepoint, showing how much each variable differs from the PM, which allows for within-person analyses (WS) (Curran & Bauer, 2011).

Descriptive statistics were calculated to get an impression of the variables. Participants demographic variables were studied. Pearson correlations were generated to study the relationship between the four PMC variables. Next, graphical visualizations were generated in the form of boxplots to visualize each person's fluctuations (within-person variations) in the studied variables. Two persons' within-person experiences of state compassion, state PEB and state affect during the study were further visualized using Microsoft Excel (2016) .

Further, floor and ceiling effects were generated by means of a frequency table as well as boxplots to see the tendencies in the data. The reliability of the Pro-environmental Behaviours Scale was assessed with Cronbach's alpha and as the data is nested ICC(1) was computed for each variable to interpret the total amount of variance within the data (Hausknecht, Hiller, & Vance, 2008). An ICC value can range between zero and one whereby a value close to 0 indicates that there is no clustering in that variable and that the observations vary over time.

Linear mixed model analyses (LMM) were conducted following Baron & Kenny (1986) mediation approach to answer the hypothesis. LMM is useful with the use of ESM as it takes the nested structural nature (within-person effect) of the data into account. Hence, LMM analyses with an autoregressive covariance structure were computed to take the nested nature of the repeated measurements per respondent and time point into account. In all LMM analyses, the Person mean-centred scores were used, the subjects were the participants, the time point was repeated and the repeated covariance type was AR(1). First, the effect of the independent variable compassion on the dependent variable PEB was calculated. Second, the effect of the independent variable compassion on the mediator variable enthusiasm was calculated. Third, the effect of the independent variable compassion, and the mediator variable enthusiasm were

calculated. The same analysis was repeated for the affect variable distress. Lastly, the Sobel test was used to test the significance of the mediation effect.

Results

Descriptive statistics

The 31 participants had an age-range from 18 to 40 ($M = 26.23$, $SD = 5.89$) with 22 females (71%) and 9 males (29%). Individuals from different nationality took part in the study with participants having the German (87.1%), Dutch (3.2%), British (3.2%), Nigerian (3.2%), or French (3.2%) nationality. On average did the sample have vocational training with English skills ($M = 3.68$, $SD = .82$) varying between good and very good.

The 744 state measurements had a missing response rate of 21.8% for PEB, corresponding to 162 state measurements. The variables compassion, NA, and PA each had a missing response of 22.2% or 165 state measurements per variable. Little's MCAR test showed that the data were missing completely at random $\chi^2(1, N = 579) = 0.098, p = .75$. Accordingly, no imputation method was applied as there was no systematic pattern in the missing data. The associations between the four variables are displayed in Table 1. The four variables are not correlated except for a weak, negative association between PEB and NA.

Table 1

Correlations between PEB PMC, compassion PMC, PA PMC, and NA PMC.

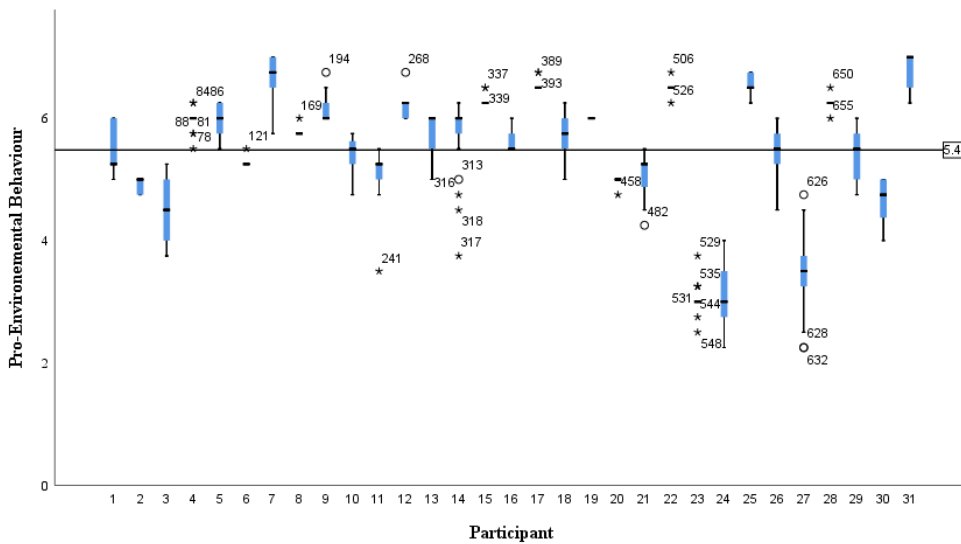
	1.	2.	3.	4.
1. PEB				
2. compassion	.045			
3. PA	.002	.041		
4. NA	-.086*	-.036	-.483**	

*p < .05 **p < .01

In general, individuals showed some variability in their PEB ($M = 5.48$, $SD = 1.02$) over the course of the study (Figure 2). As can be seen, there were both fluctuations within-persons and between-persons PEB which indicates that there are differences between individuals as well as differences within a person's PEB across time. Nonetheless, the PEB variable was extremely skewed to the left, with a skewness of -1.18 ($SE = 0.10$) and kurtosis of 0.96 ($SE = 0.20$) indicating a ceiling effect in the data. As such, participants PEB scores showed a lack of variance, reflected in the Shapiro-Wilk ($p < .001$).

Figure 2

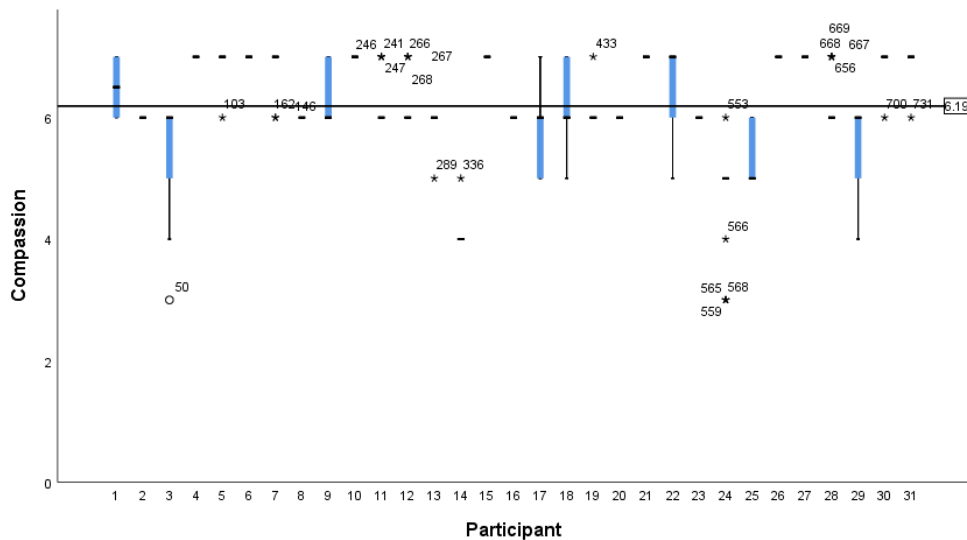
Boxplot depicting the Variation in PEB for each Participant with a Reference Line set at the Group Mean ($M = 5.48$)



Participants scored very high in compassion ($M = 6.19$, $SD = 0.85$). The compassion variable was extremely skewed to the left, with a skewness of -1.16 ($SE = 0.10$) and kurtosis of 1.48 ($SE = 0.20$). The compassion scores indicated a lack of variance, reflected in the Shapiro-Wilk ($p < .001$). Taken together, this indicates a ceiling effect and little between person variability. As can be seen in Figure 3, there was also little variability within a person's levels of compassion over the course of the study as most participants, except for 8 persons, indicated the same compassion scores across time.

Figure 3

Boxplot depicting the Variation in Compassion for each Participant with a Reference Line set at the Group Mean ($M = 6.19$)



On average, the participants tend to feel more enthusiasm ($M = 4.90$, $SD = 1.25$) than distress ($M = 3.14$, $SD = 1.66$) (see Figure 4 and 5). As displayed, there were substantial fluctuations within a person's experience of enthusiasm and distress over the study period as well as great differences between the participants' variations in affective states. The affect state levels indicated a lack of variance, reflected in the Shapiro-Wilk ($p < .001$). However, in contrast to the previous variables, the lack of variance was not as extreme in the affect variables as enthusiasm had a skewness of -0.81 ($SE = 0.10$) and kurtosis of 0.52 ($SE = 0.20$) whereby distress was somewhat symmetrical with a slight left skewness of 0.43 ($SE = 0.10$) and kurtosis of -0.87 ($SE = 0.20$).

Figure 4

Boxplot depicting the variation in Enthusiasm for each participant with a reference line set at the group mean ($M = 4.90$).

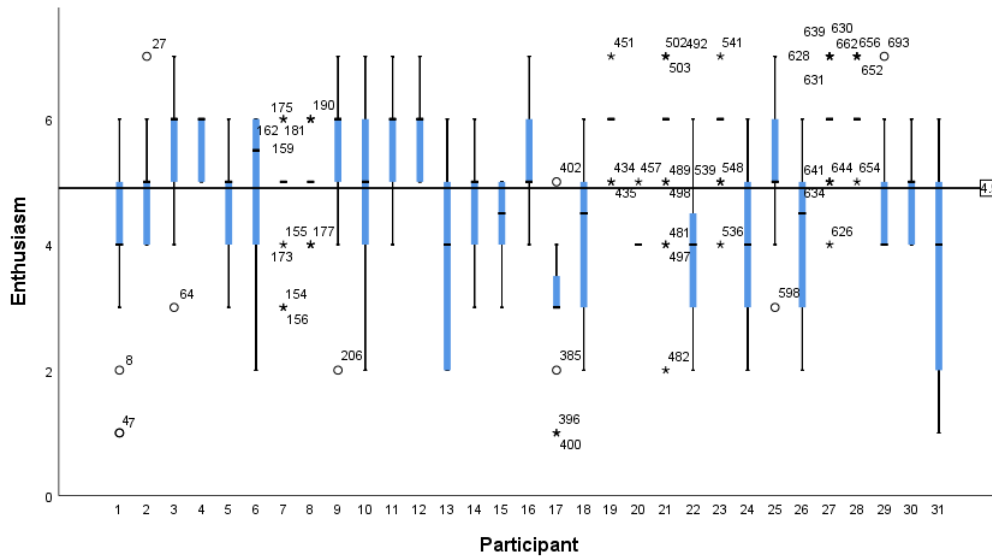
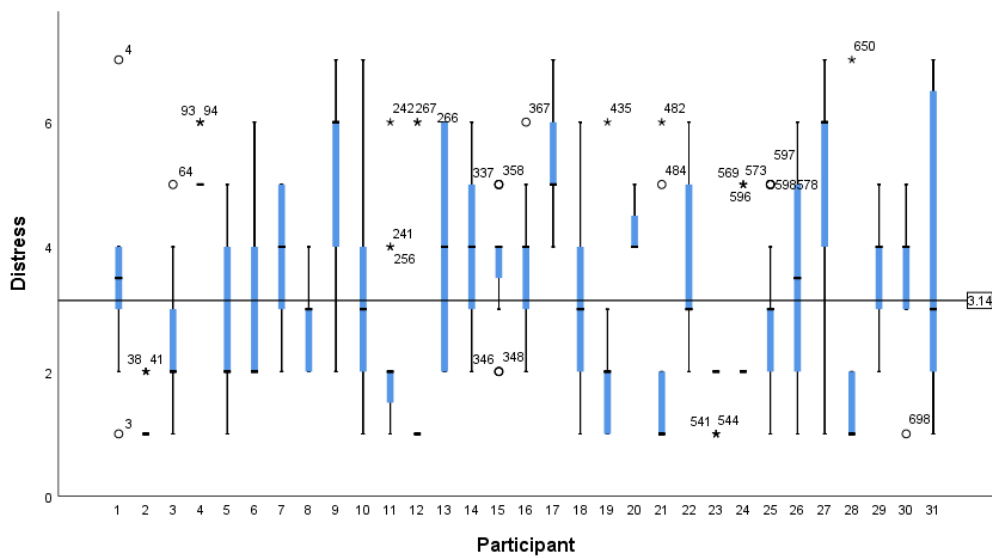


Figure 5

Boxplot depicting the variation in Distress for each participant with a reference line set at the group mean ($M = 3.14$).



Reliability Assessment

Reliability

The Pro-Environment Scale showed good reliability with $\alpha = .759$.

Interclass coefficient

The affect variables showed a moderate amount of clustering with $ICC(1) = .45$ for distress and $ICC(1) = .38$ for enthusiasm. There was great variance in those affective states over time. In contrast, PEB with $ICC(1) = .90$ showed almost no variance over time as there is a high level of clustering. Compassion also showed a high level of clustering with an $ICC(1) = .79$. As such, there is little variance in individuals scores in these two variables over the course of the study.

State Compassion, State Pro-Environmental Behaviours, and State Affect

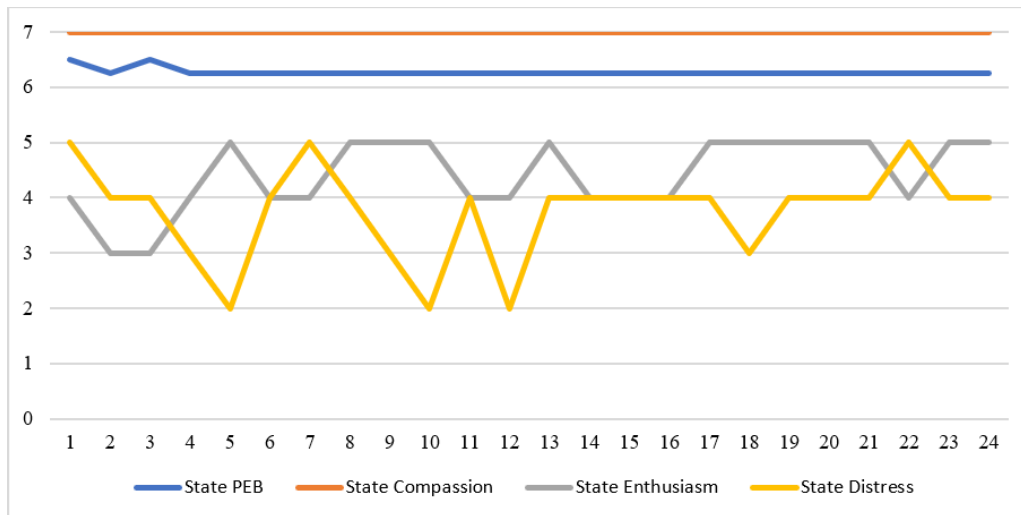
Individual Cases for Visualization

Individual participants' data were chosen to depict personal fluctuations in state Compassion and state PEB over the course of the study.

Participant 15. Participant 15 (Figure 6) scored very high on state compassion and state PEB. The individual perceived being there for others in times of difficulty as continuously very important (PM = 7.00). The same importance was assigned to PEB (PM= 6.27) with minor fluctuations at timepoint two, three and four. Further, did the person experience fluctuations in his/her PA (PM= 4.42) and NA (PM= 3.75), ranging from two (Somewhat disagree) to five (A little agree). During the time of the study, the person did not feel very enthusiastic nor very distressed but fluctuated in the middle range.

Figure 6

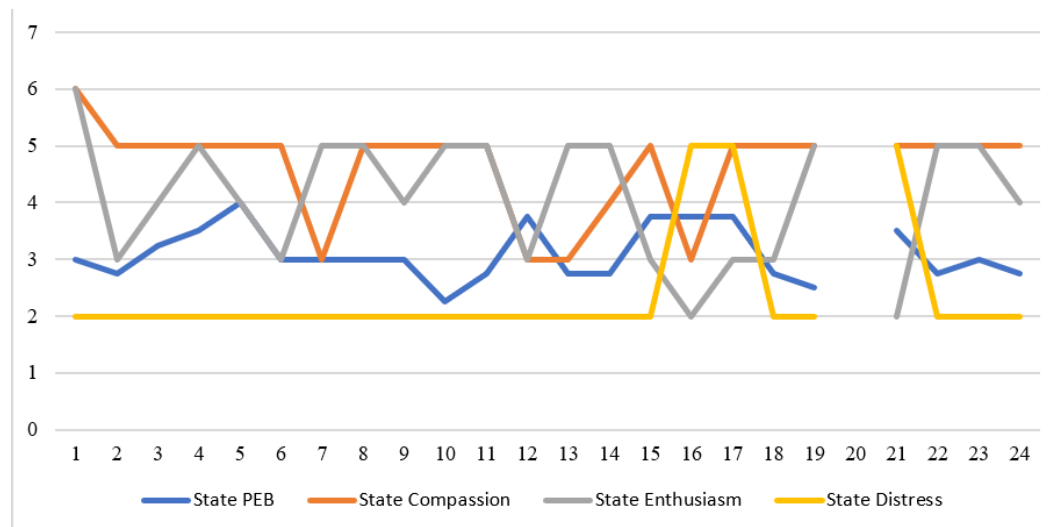
Line graph depicting high state compassion levels per timepoint for participant 15.



Participant 24. Participant 24 (Figure 7) scored low on PEB (PM = 3.10) and in Compassion (PM = 4.65) in comparison to the scores of other participants. The individual has many fluctuations in PEB, ranging from two and twenty-five (Somewhat disagree) to four (Neither agree or disagree) as well as in Enthusiasm, ranging from two (Somewhat disagree) to six (Somewhat agree). However, the person's level of compassion is more stable (PM = 4.65) with moderate fluctuations, ranging from three (A little disagree) to six (Somewhat agree). Distress is very stable in this person with a score of two (Somewhat disagree) (PM = 2.00) with deviations on day 16,17 and 21 to a score of five (A little agree).

Figure 7

Line graph depicting high state PEB levels per timepoint for participant 24



Mediation analysis

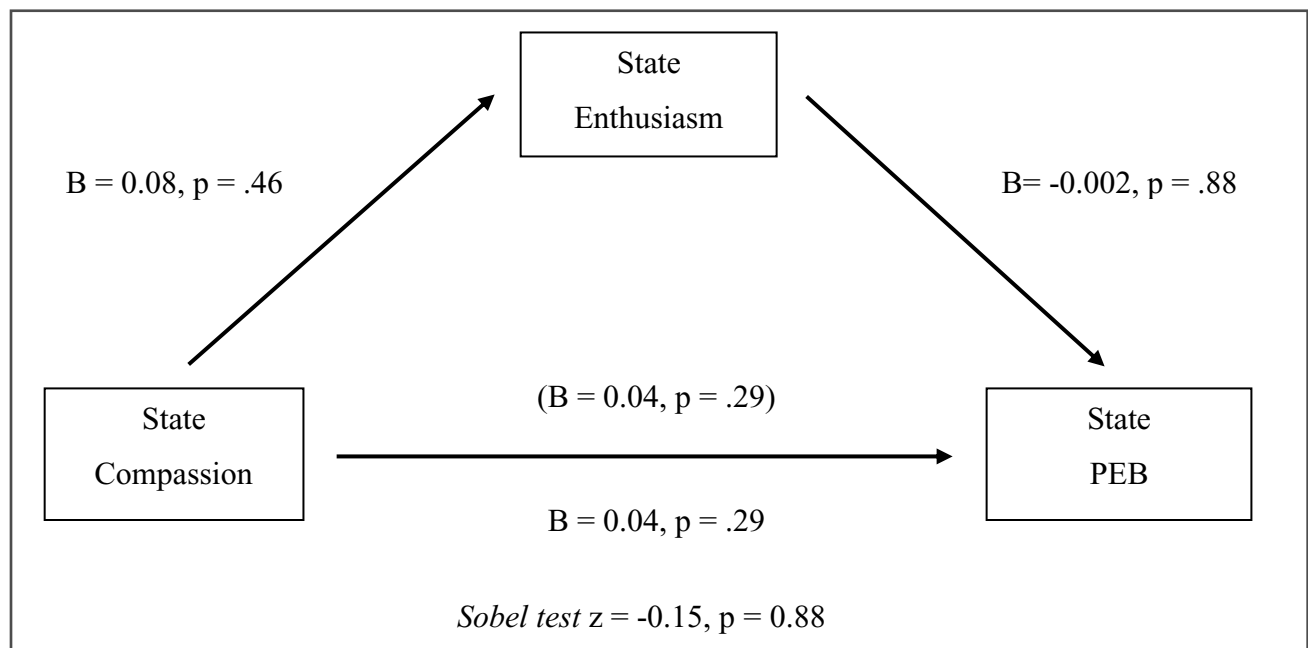
Linear mixed model analyses were conducted to study the relationship between compassion and PEB through the influence of the mediators positive and negative affect. State compassion was not found to significantly predict state PEB $t(578.90) = 1.06, p = .29, CI [-.03, .10]$. As such, a direct relationship between state compassion and state PEB was not observable (see Figure 7 and 8).

First, the relationship was studied with positive affect (Figure 8). State compassion did not significantly predict state enthusiasm $t(576.30) = 0.75, p = .46, CI [-.133, .30]$. Individuals did not experience enthusiasm as a response to compassion as the independent variable compassion did not predict the mediator enthusiasm. Additionally, the relationship between state compassion and enthusiasm was non-significant when both compassion and enthusiasm were predictors of PEB (for compassion: $t(578.86) = 1.06, p = .29, 95\% CI [-.03, .10]$; for enthusiasm

$t(574.59) = -0.16, p = .88, 95\% \text{ CI } [-.03, .02]$). Therefore, the association between compassion and PEB was not influenced by taking the mediating variable enthusiasm into account and an indirect effect of enthusiasm was not observable. The Sobel test confirmed the insignificance of the indirect effect of compassion on PEB via enthusiasm, $z = -0.15, p = .88$. This finding stands in contrast with the hypothesis that positive affect leads to higher levels of PEB.

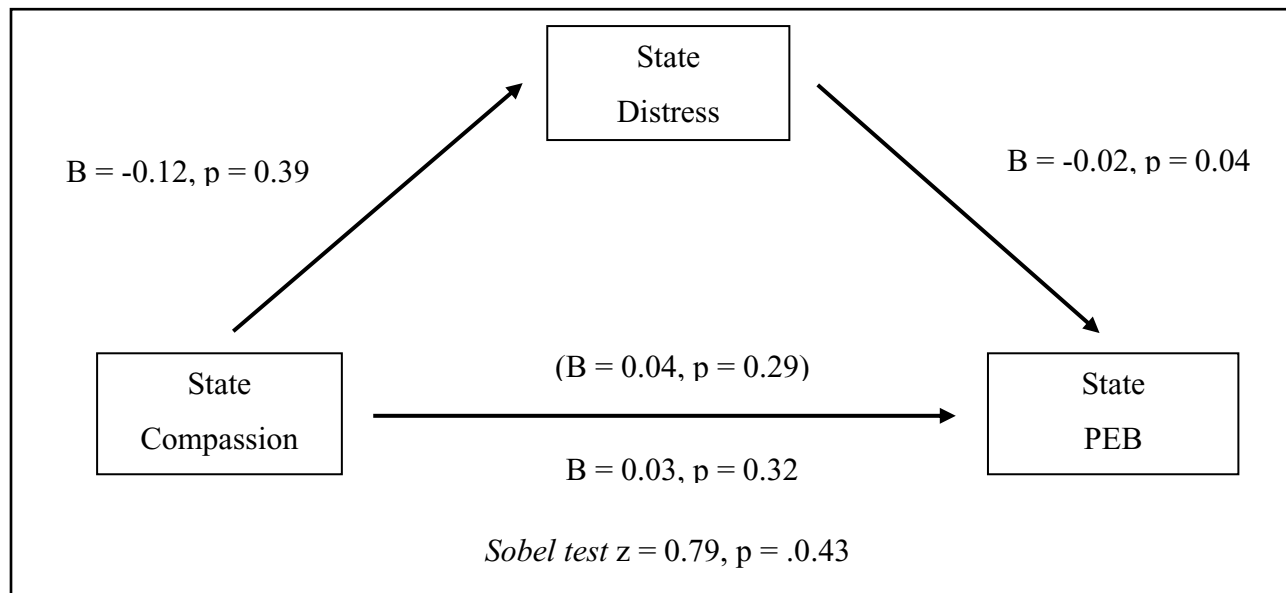
Figure 8

Mediation model for State Compassion, State Enthusiasm and State PEB



Note. The coefficient and p-value above the arrow between State Compassion and State PEB refer to the direct effect (c) and the coefficient and p-value below the arrow refer to the indirect effect (c').

Secondly, the relationship was studied with negative affect (Figure 9). State compassion did not significantly predict state distress $t(578.73) = -.86, p = .39, CI [-.38, .15]$. Individuals did not experience distress as a response to compassion as the independent variable compassion did not predict the mediator distress. Additionally, the relationship between state compassion and PEB was non-significant when taking both state compassion and distress as predictor variables $t(578.93) = .99, p = .32, CI [-.03, .10]$. However, it was found that distress significantly predicts PEB, $t(578.37) = -2.01, p = .04, CI [-.04, -.0005]$. This shows a negative within-person association ($B = -0.02, SE = .01, p = .04$) between state distress and state PEB. Following, Baron & Kenny's (1986) conditions for mediation, the significant indirect effect of the mediator distress on PEB while the relationship between compassion and PEB is insignificant indicates a full mediation effect of distress. However, as the general conditions for mediation were not met a full mediation cannot be assumed (for an explanation of conditions for mediation see Baron & Kenny's, 1986). The Sobel test confirmed the insignificance of the indirect effect, $z = 0.79, p = .43$.

Figure 9*Mediation model for State Compassion, State Distress and State PEB*

Note. The coefficient and p-value above the arrow between State Compassion and State PEB refer to the direct effect (c) and the coefficient and p-value below the arrow refer to the indirect effect (c').

Discussion

The purpose of this study was to investigate the influence of positive and negative state affect on the relationship between state compassion and state pro-environmental behaviours in the context of daily life. More specifically, it was examined whether daily fluctuations in positive and negative affect mediate daily fluctuations in compassion and PEB. It is hypothesized that positive and negative state affect mediate the relationship between state compassion and state pro-environmental behaviours. Yet support for this effect was not found. First, the results do not support a direct relationship between compassion and PEB. This implies that an individual's momentary pro-environmental behaviours are not influenced by the individual's momentary

experience of compassion. Second, an indirect influence of compassion on PEB through state enthusiasm was not found. Third, an indirect influence of compassion on PEB through the affect state distress was not found. However, state distress was found to predict state PEB negatively.

Interpretation of Results and Theoretical Implications

The current study could not replicate findings in previous research. Previous studies have shown that compassion for other humans is a crucial factor in fostering pro-environmental behaviours (Greving & Kimmerle, 2021; Pfattheicher et al., 2016). Yet support for this assumption was not found in this study as the findings indicate that daily fluctuations in compassion for others do not predict daily PEB. Following previous studies, compassion was defined as “the feeling that arises in witnessing another's suffering and that motivates a subsequent desire to help” (Goetz et al., 2010, p.2). The witnessing of suffering is central for compassion to be elicited. Therefore, previous research used stimuli like photographs of suffering and distressed racoons and foxes (Greving & Kimmerle, 2021) or pictures of a homeless person and a sick child (Pfattheicher et al., 2016) to experimentally create the witnessing of another's suffering. These studies actively manipulated compassion. In contrast, the present study did not manipulate compassion as participants were generally asked if they like to be there for others in times of difficulty. Hence, this study deviated from the conceptual understanding of compassion as it was not accounted for that suffering needs to be witnessed. Thus, the lack of relationship between compassion and PEB, despite general high scores in compassion, implies that witnessing suffering is a core element for compassion to influence behaviour.

Further, previous research on the role of compassion on PEB has most often followed one

of the conceptual frameworks, namely the Theory of Planned Behaviour, the Norm-Activation-Theory or the Value-Belief-Norm-Theory (Sopha, 2011). For example, Pfattheicher et al. (2015) followed the value-belief-norm (VBN) theory by Schwartz and Howard (1981). The theory builds on the importance of values as they guide one's awareness of consequences (belief that an object faces harm) and one's ascription of personal responsibility (belief that one is personally responsible for alleviating the harm). These beliefs activate personal moral norms which lead to one's engagement in helping behaviours, including PEB (Batavia et al. 2020; Berenguer, 2010). Pfattheicher et al. (2015) argue that compassion evokes moral judgments and actions which leads to pro-environmental tendencies. Consequently, the lack of association between compassion and PEB might be related to a lack of consideration of the role of cognition, namely one's values and beliefs, in compassion. The present study assumed that compassion elicits PEB only by eliciting affective states. Nonetheless, high compassion scores did not predict PEB which indicates that assuming compassion predicts PEB without any influence of cognitive components was misleading.

The current study did not support the hypothesis that positive affect mediates the relationship between state compassion and state pro-environmental behaviours. First, compassion did not elicit enthusiasm. It was hypothesised that compassion would elicit enthusiasm because compassion can be experienced as a 'heart-warming' emotion (Condo & Barrett, 2013). The findings indicate that individuals did not experience compassion in such a manner. This can be explained by the conceptual arbitrariness of compassion. Compassion can be experienced as both a positive and negative emotional state whereby most research findings have only found support for the negative experience of compassion (Condo & Barrett, 2013; Greving & Kimmerle, 2021; Pfattheicher et al., 2016). Thus, the present study did not further in

resolving the emotional arbitrariness of compassion. Second, enthusiasm did not elicit PEB. It was hypothesized that activating positive affect elicits approach behaviours such as PEB based on the Broaden-and-Build Model of Positive Emotions and research conducted by Bissing-Olson et al. (2013, 2015, 2016). These scholars have extensively studied affect and PEB in daily life and showed that positive affect positively influences PEB (Bissing-Olson et al., 2013, 2015, 2016). However, they considered the influence of attitudes (Bissing- Olson et al., 2013). In the workplace, pro-environmental attitude was found to moderate the effect of enthusiasm on daily proactive PEB. Enthusiasm positively predicted daily PEB only when employees had a less positive pro-environmental attitude than when they had a more positive pro-environmental attitude (Bissing- Olson et al., 2013). Thus, it might be that enthusiasm also only influences the relationship between compassion and PEB in the presence of a cognitive component like attitude.

The hypothesis that negative affect mediates the relationship between state compassion and state pro-environmental behaviours was not supported, however, distress was associated with PEB. Bissing-Olson et al. (2013, 2015, 2016) argued, based on the Broaden-and-Build Model of Positive Emotions, that negative affect neither inhibits nor promotes PEB as high levels of negative affect, such as aggression, are needed to evoke an inhibiting effect of emotions. However, the findings in this study indicate an inhibiting effect of distress on PEB. The finding can be explained using appraisal theory which states that the interpretation of an event rather than the event itself elicits an emotion (Roseman & Smith, 2001). The interpretation of an event is in turn based on a number of personal appraisal dimensions. These appraisal dimensions can be summarized as agency (responsibility and controllability), outcome desirability (evaluative and motivational processes), certainty, fairness, and coping potential (Keller et al., 2012). For example, if the event ‘driving by public transport’ is evaluated as

unpleasant and undesirable as it intervenes with one's desires and goals, it elicits a negative emotional response, such as distress. Consequently, PEB is avoided as the individual evaluates it negatively.

Moreover, if nothing can be done about the situation then emotions resulting in the avoidance of those emotions are most useful (Roseman & Smith, 2001). Therefore, distress might be negatively related to PEB as people avoid it to cope with their distress. This is similar to what happens in eco-anxiety. The term describes a range of mental states and emotions arising from environmental conditions and knowledge about them (Pihkala, 2018). Individuals with eco-anxiety repetitive worry and ruminate in response to environmental concerns (Verplanken et al., 2020). They ask themselves existential questions like 'Why do the innocent suffer?' instead of actively engaging in positive behaviours for the environment (Pihkala, 2018). Thus, distress or eco-anxiety is unconstructive as it impairs one's cognitive functioning as well as result in behavioural and cognitive avoidance of environmental problems (Verplanken et al., 2020).

Limitations and Strengths

This study was highly impacted by its limitations. Firstly, participants tend to highly agree with the questions concerning their state PEB, compassion and enthusiasm which created a ceiling effect. Especially, concerning compassion, this effect stood out. The item was chosen as it is close to the definition of compassion, however, the item 'I like to be there for others in times of difficulty' is something most people tend to agree with. Moreover, the statement has a high social desirability response bias as it reflects a highly socially valued behaviour. Social desirability response bias refers to the tendency of participants to present themselves in favourable images (van de Mortel, 2008). Therefore, it can be said that participants were

influenced by social desirability and/or unreflected agreement when answering the item. In hindsight, the bias could have been prevented in two ways. Firstly, by incorporating items from social desirability scales, such as the Marlowe-Crowne Social Desirability Scale (1960), to detect persons who generally tend to portray themselves in more socially desirable ways (van de Mortel, 2008). For these reasons, social desirability might have confounded the relationship between compassion and PEB by obscuring or suppressing the relationship (van de Mortel, 2008). Secondly, by choosing a compassion item less influenced by bias. Compassion has been successfully studied in the daily context i.e., concerning health behaviours and pro-social behaviours (e.g., Li et al, 2020; Runyan et al., 2019) and as single item measurements (Condo & Barrett, 2013). Hence, daily compassion indeed influences behaviour and it cannot be ruled out that compassion does not predict PEB due to the high social desirability of the item. Secondly, the context of the affective state is unknown. The current study cannot say whether distress or enthusiasm were elicited in response to compassion or any other event in a person's daily life. The link is assumed but it was not embedded in the design of the research.

Nonetheless, this study had four strong points. This study contributes to the literature about compassion and PEB, especially in the context of daily life. First, previous research has shown the influence of either affect (Bissing-Olson et al., 2015) or compassion (Pfattheicher, 2016) on PEB, but the simultaneous influence has not been considered. Second, previous research manipulated compassion experimentally to study its effect on PEB and thereby neglected that such a manipulation is not possible outside the experimental setting. By studying the relation between compassion and PEB in the daily context a more realistic understanding could be gained. Third, the study examined both positive and negative emotional dimensions of compassion and thereby adds to affect research, following Condon & Barrett's (2013)

recommendations. Lastly, the use of ESM provided unique insights into how individuals experienced these variables in real life.

Future Research

To address the limitations of this study future research should address the theoretical issues. Compassion should be measured more closely to its conceptualization rather than in its broad context. Moreover, questions about individuals emotional state should be context-specific to assess whether the emotion is related to the studied relationship. In future studies, a focus on compassion for nature is recommended as it enables direct assessment of the elicited emotions by compassion for nature rather than having to imply apply the same effects of compassion for humans and nature. The present study also suggests that more is needed for a mediation effect of affect on compassion and PEB. Therefore, the conditions for mediation should be considered more extensively by expanding the conceptual framework. Most interestingly, cognitive components such as attitudes, personal values and beliefs should be added. On another note, future work should examine the direct inhibiting effect of distress on PEB.

Conclusion

Promoting PEB is a challenging task. To facilitate a better comprehension of individual-level factors determining PEB the current study considered the so-far neglected influence of emotions on the relationship between daily state compassion and daily state PEB. This study provides insights into the associations between those constructs in the context of real life. Hereby, it was found that distress influences PEB negatively.

References

- Axelrod, L. J., & Lehman, D. R. (1993). Responding to environmental concerns: What factors guide individual action? *Journal of Environmental Psychology, 13*(2), 149-159
[doi.org/10.1016/S0272-4944\(05\)80147-1](https://doi.org/10.1016/S0272-4944(05)80147-1).
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182. doi: 10.1037//0022-3514.51.6.1173
- Batavia, C., Bruskotter, J. T., & Nelson, M. P. (2020). Pathways from environmental ethics to pro-environmental behaviours? Insights from psychology. *Environmental Values, 29*(3), 317-337. doi.org/10.3197/096327119X15579936382572
- Berenguer, J. (2007). The effect of empathy in proenvironmental attitudes and behaviors. *Environment and behavior, 39*(2), 269-283. doi.org/10.1177/0013916506292937
- Berenguer, J. (2010). The effect of empathy in environmental moral reasoning. *Environment and Behavior, 42*(1), 110-134. doi.org/10.1177/0013916508325892
- Bissing-Olson, M.J. (2015). *Affect and Pro-environmental Behavior in Everyday Life* (Doctoral dissertation, The University of Queensland). Retrieved from <https://core.ac.uk/download/pdf/43390196.pdf>
- Bissing-Olson, M. J., Fielding, K. S., & Iyer, A. (2016). Experiences of pride, not guilt, predict pro-environmental behavior when pro-environmental descriptive norms are more positive. *Journal of Environmental Psychology, 45*, 145-153.
doi.org/10.1016/j.jenvp.2016.01.001

- Bissing-Olson, M. J., Iyer, A., Fielding, K. S., & Zacher, H. (2013). Relationships between daily affect and pro-environmental behavior at work: The moderating role of pro environmental attitude. *Journal of Organizational Behavior*, 34(2), 156-175. doi.org/10.1002/job.1788
- Carrus, G., Passafaro, P., & Bonnes, M. (2008). Emotions, habits and rational choices in ecological behaviours: The case of recycling and use of public transportation. *Journal of environmental psychology*, 28(1), 51-62. doi.org/doi.org/10.1016/j.jenvp.2007.09.003
- Coelho, F., Pereira, M. C., Cruz, L., Simões, P., & Barata, E. (2017). Affect and the adoption of pro-environmental behaviour: A structural model. *Journal of Environmental Psychology*, 54, 127-138. doi.org/10.1016/j.jenvp.2017.10.008
- Condon, P., & Feldman Barrett, L. (2013). Conceptualizing and experiencing compassion. *Emotion*, 13(5), 817. doi: 10.1037/a0033747
- Conner, T. S., & Lehman, B. (2012). Getting Started: Launching a Study in Daily Life. In M.R. Mehl, & T.S., Conner (Eds.) *The Handbook of Research Methods for Studying Daily Life*. Guilford Press: New York
- Crowne, D. and Marlowe, D. 1960. A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology*, 24(4), 349-354. doi.org/10.1037/h0047358

Curran, P. J., & Bauer, D. J. (2011). The Disaggregation of Within-Person and Between-Person Effects in Longitudinal Models of Change. *Annual Review of Psychology*, 62(1), 583–619. doi.org/10.1146/annurev.psych.093008.100356

De Groot, J. I., & Steg, L. (2009). Mean or green: which values can promote stable pro-environmental behavior?. *Conservation Letters*, 2(2), 61-66. doi.org/10.1111/j.1755-263X.2009.00048.x

Eisenberg, N., & Miller, P. A. (1987). The relation of empathy to prosocial and related behaviors. *Psychological bulletin*, 101(1), 91. doi.org/10.1037/0033-2909.101.1.91

Ethica (2021). [Ethica enables people to convert their smartphone into a micro research lab, so they can join scientists in finding life-changing discoveries]. Retrieved from <https://ethicadata.com/about/>

Fredrickson, B. L. (1998). Cultivated emotions: Parental socialization of positive emotions and self-conscious emotions. *Psychological Inquiry*, 9(4), 279-281. doi.org/10.1207/s15327965pli0904_4

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American psychologist*, 56(3), 218. doi:10.1037//0003-066X.56.3.218

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

Greving, H., & Kimmerle, J. (2021). You poor little thing! The role of compassion for wildlife conservation. *Human Dimensions of Wildlife*, 26(2), 115-131. doi.org/

10.1080/10871209.2020.1800146

Harth, N. S., Leach, C. W., & Kessler, T. (2013). Guilt, anger, and pride about in-group environmental behaviour: Different emotions predict distinct intentions. *Journal of Environmental Psychology*, 34, 18-26. doi.org/10.1016/j.jenvp.2012.12.005

Hartmann, P., Ibáñez, V. A., & Sainz, F. J. F. (2005). Green branding effects on attitude: functional versus emotional positioning strategies. *Marketing intelligence & planning*, 23(1), 9-29. doi.org/10.1108/02634500510577447

Hausknecht, J. P., Hiller, N. J., & Vance, R. J. (2008). Work-unit absenteeism: Effects of satisfaction, commitment, labor market conditions, and time. *Academy of management journal*, 51(6), 1223-1245. Retrieved from <https://www.jstor.org/stable/pdf/40390270.pdf>

Keller, C., Bostrom, A., Kuttuschreuter, M., Savadori, L., Spence, A., & White, M. (2012). Bringing appraisal theory to environmental risk perception: a review of conceptual approaches of the past 40 years and suggestions for future research. *Journal of risk research*, 15(3), 237-256. doi.org/10.1080/13669877.2011.634523

Koenig-Lewis, N., Palmer, A., Dermody, J., & Urbye, A. (2014). Consumers' evaluations of ecological packaging—Rational and emotional approaches. *Journal of environmental psychology*, 37, 94-105. doi.org/10.1016/j.jenvp.2013.11.009

Li, Y., Deng, J., Lou, X., Wang, H., & Wang, Y. (2020). A daily diary study of the relationships among daily self-compassion, perceived stress and health-promoting

- behaviours. *International Journal of Psychology*, 55(3), 364-372. doi.org/10.1002/ijop.12610
- Lu, H., & Schuldt, J. P. (2016). Compassion for climate change victims and support for mitigation policy. *Journal of Environmental Psychology*, 45, 192–200. doi.org/10.1016/j.jenvp.2016.01.007
- 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.org/10.1007/s10745-013-9614-8
- McKenzie-Mohr, D., Nemiroff, L. S., Beers, L., & Desmarais, S. (1995). Determinants of responsible environmental behavior. *Journal of Social Issues*, 51(4), 139-156. doi.org/10.1111/j.1540-4560.1995.tb01352.x
- Myin-Germeys, I., Kasanova, Z., Vaessen, T., Vachon, H., Kirtley, O., Viechtbauer, W., & Reininghaus, U. (2018). Experience sampling methodology in mental health research: new insights and technical developments. *World Psychiatry*, 17(2), 123-132. doi.org/10.1002/wps.20513
- 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.org/10.1177/0013916515574549
- Pihkala, P. (2018). Eco-anxiety, tragedy, and hope: Psychological and spiritual dimensions of climate change: The Wicked Problem of Climate Change. *Journal of Religion & Science*, 53(2), 545-569. doi.org/10.1111/zygo.12407

Pommier, E., Neff, K. D., & Tóth-Király, I. (2020). The development and validation of the Compassion Scale. *Assessment*, 27(1), 21-39. doi.org/10.1177/1073191119874108
journals.sagepub.com/home/asm

Roseman, I. J., & Smith, C. A. (2001). Appraisal theories. In K. R. Sherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, method, research* (pp. 3-19). Oxford: Oxford University 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 pro-social behavior. *Journal of personality*, 87(3), 690-701.
doi.org/10.1111/jopy.12426

Sassenrath, C., Pfattheicher, S., & Keller, J. (2017). I might ease your pain, but only if you're sad: The impact of the empathized emotion in the empathy-helping association. *Motivation and Emotion*, 41(1), 96-106.
doi.org/http://dx.doi.10.1007/s11031-016-9586-2

Schultz, P. W. (2000). New environmental theories: Empathizing with nature: The effects of Perspective taking on concern for environmental issues. *Journal of social issues*, 56(3), 391-406. doi.org/10.1111/0022-4537.00174

Schultz, P. W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of environmental psychology*, 21(4), 327-339.
doi.org/10.1006/jevp.2001.0227

- Schwartz, S.H., Howard, J.A. (1981). A normative decision-making model of altruism. In Rushton, J.P., Sorrentino, R.M. (Eds.), *Altruism and Helping Behavior*. Lawrence Erlbaum, Hillsdale, NJ, pp. 89–211.
- Sevillano, V., Aragonés, J. I., & Schultz, P. W. (2007). Perspective taking, environmental concern, and the moderating role of dispositional empathy. *Environment and behavior*, 39(5), 685-705. doi.org/10.1177/0013916506292334
- Shaver, P., Schwartz, J., Kirson, D., & O'connor, C. (1987). Emotion knowledge: further exploration of a prototype approach. *Journal of personality and social psychology*, 52(6), 1061. doi.org/10.1037/0022-3514.52.6.1061
- Shiota, M. N., Papiés, E. K., Preston, S. D., & Sauter, D. A. (2021). Positive affect and behavior change. *Current Opinion in Behavioral Sciences*, 39, 222-228. doi.org/10.1016/j.cobeha.2021.04.022
- Singer, T., & Klimecki, O. M. (2014). Empathy and compassion. *Current Biology*, 24(18), R875-R878. doi.org/10.1016/j.cub.2014.06.054
- Sopha, B.M., 2011. Literature Research on Energy Behaviour: Behavioural Models, Determinants, Indicators, Barriers and Interventions. Report in the Enova Project “Indicators of Determinants of Household Energy Behaviours” Enova, Trondheim, Norway.
- Stern, P. C. (2000). Psychology and the science of human–environment interactions. *American psychologist*, 55(5), 523-530. doi.org/10.1037/0003-066X.55.5.523

- Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of social issues*, 56(3), 407-424. doi.org/10.1111/0022- 4537.00175
- Tam, K. P. (2013). Dispositional empathy with nature. *Journal of environmental psychology*, 35, 92-104. doi.org/10.1016/j.jenvp.2013.05.004
- Van Berkel, N., Ferreira, D., & Kostakos, V. (2018). The experience sampling method on mobile devices. *ACM Computing Surveys (CSUR)*, 50(6), 93. doi.org/10.1145/3123988
- Van de Mortel, T. F. (2008). Faking it: social desirability response bias in self-report research. *Australian Journal of Advanced Nursing, The*, 25(4), 40. doi: researchportal.scu.edu.au/discovery/fulldisplay/alma991012821838002368/61SU_INST:Research Repository
- Verplanken, B., Marks, E., & Dobromir, A. I. (2020). On the nature of eco-anxiety: How constructive or unconstructive is habitual worry about global warming?. *Journal of Environmental Psychology*, 72, 101528. doi.org/10.1016/j.jenvp.2020.101528
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of personality and social psychology*, 54(6), 1063-1070. doi.org/10.1037//0022-3514.54.6.1063
- Zelenski, J. M., & Desrochers, J. E. (2021). Can positive and self-transcendent emotions promote pro-environmental behavior?. *Current Opinion in Psychology*. doi.org/10.1016/j.copsy.2021.02.009

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]