Climate Change Distress and Pro-Environmental Behaviour: An Exploration Into the Role of Self-Determination

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Abstract

The quickly progressing climate-change is associated with rising psychological distress. This study investigates the association of self-determination level and pro-environmental behaviour, with the mediating roles of climate-change-anxiety and climate-change-distress. In an online cross-sectional survey (117 participants; 75% female, 21% male, 3% non-binary; aged 20-58), level of self-determination, degree of climate-change-anxiety and -paralysis and exertion of pro-environmental behaviour were measured. The results indicate a significant total effect of self-determination on pro-environmental behaviour, as well as a significant indirect effect of climate-change-anxiety but not climate-change-paralysis in mediating the relationship between self-determination and pro-environmental behaviour. Concludingly, the importance of fostering self-determination for behaving pro-environmentally, as well as differentiating between expressions of distress connected to climate-change is illustrated.

Keywords: self-determination, climate-change-anxiety, climate-change-paralysis, pro-environmental behaviour

Climate-change – Pronounced effects are diverse. Natural disasters as well as a global rise in temperature and sea level endanger the habitat (Clayton, 2020). While in 2017, 68.5 million people lived forcedly displaced by climate-change, an additional 143 million climate-change refugees are expected by 2050 (Rigaud et al., 2018). However, not only physical well-being is at stake, also the mental health of many individuals appears threatened by environmental degradation (Morganstein & Ursano, 2020). While the psychological effects of experiencing natural catastrophes, caused by climate-change first-hand, have been long known (Manning & Clayton, 2018), recent literature has further reported on a rather silent epidemic of extreme climate-change-concern. Hence, the mere knowledge of a deteriorating environment seems sufficient for severe stress reactions (Clayton, 2020). Psychological distress associated with climate-change is an increasingly prevalent mental-health-issue in society, especially rising among the younger generations (American Psychological Association, 2018; Gibson et al., 2020). We are likely facing the biggest humanitarian crisis ever seen, not only for ecological but also for psychological reasons (Howard, 2000; Oskamp, 2000; Winter, 2000).

Since individual pro-environmental behaviour showed essential for containing further environmental degradation (Howard, 2000; Oskamp, 2000; Winter, 2000), exploring and altering individual and societal motivation to perform pro-environmentally must become our top priority. Given the importance of self-determination level for even this pro-environmental behaviour, Pelletier et al. (2011) recommend a closer examination of mechanisms surrounding the relationship. Understanding and enhancing mental well-being connected to climate-change is of equal importance. People must learn to adapt to climate-change as new reality and to cope with the new environmental threat, otherwise the quickly rising level of climate-change-distress in the population, may disrupt not only individual but also societal functioning (Clayton, 2020). It is proposed that climate-change-distress must be strictly divided between an adaptive expression such as climate-change-anxiety and a non-adaptive one, such as climate-change-paralysis. The adaptiveness of the distinct forms seems to have different implications for the integration of climate-change related information (Albrecht, 2011), as well as subsequent pro-environmental action (Clayton, 2020). Therefore, the goal of this study was to elevate the understanding of the association between self-determination and pro-environmental behaviour under consideration of the potentially underlying mechanism of climate-change-anxiety and climate-change-paralysis. This knowledge could contribute to understanding the underlying psychological distress and its treatment as well as the nature of

interventions that must be created to motivate the public to perform more pro-environmentally.

Climate Change Distress

The visibly strong impact climate-change seems to have on mental health, may on the one hand be explainable by grieving for loss of personal or global goods or places, but on the other hand also by an anticipatory concern for future harm of self or own children (Wang et al., 2018). Gibson et al. (2020) reported as many as 95% of their participants experienced feelings of distress, with 87% describing their experience with climate-change as "impairing normal functioning" (Gibson et al., 2020). The progressive nature of climate-change illustrates an unavoidability, which likely causes a rational degree of worry, which should not be pathologized, however. Thus, fear of an environmental threat such as climate-change can to a certain degree be seen as a functional and adaptive response, as it has a preparatory effect for possible future catastrophes (Clayton & Karazsia, 2020). This is in the literature commonly referred to as *climate-change-anxiety* (CCA), a worry connected to negative environmental information (Albrecht, 2011), oftentimes eliciting feelings of tension, concern and anger (Searle & Gow, 2010). However, alarming are severe stress reactions which diminish the individual's life-quality and functioning (Clayton, 2020), such as *climate-change-paralysis* (CCP; Clayton & Karazsia, 2020). This is a non-adaptive feeling of numbness, passivity and apathy caused by the awareness of the drastic consequences of climate-change (Albrecht, 2011; Moser, 2007). Wolfe and Tubi (2019) suggested that the accompanying fear can be of such intense nature, that it can lead to inaction and even apathy. It is especially characterized by feelings of powerlessness, helplessness and hopelessness (Searle & Gow, 2010). The differentiation between climate-change-anxiety and climate-change-paralysis is important because the respective expression of climate-change-distress gives insight into the adaptiveness of the individual experience of climate-change and therefore reflects a strength of this research.

Self-Determination Theory

Self-determination seems to play a crucial role for the development of these qualitatively different forms of climate-change-distress. According to the self-determination theory (SDT; Deci & Ryan, 1985, 1991, 2000), personal motivation must be distinguished into different types, based on the underlying reasons for a behaviour. The quality of motivation differs in terms of degree of integration and behavioural regulation which consequently impacts the maintenance of an action. SDT distinguishes between internalized and thus autonomous and non-internalized, namely controlled motivation. If an action is

autonomous (Deci & Ryan, 2000), it is performed voluntarily, even if the behaviour itself is not enjoyable to the individual. Autonomously motivated actions can be divided into either *intrinsic* or *identified* motivation for a behaviour. While an intrinsically motivated action is an action motivated by interest and enjoyment of the experience, an identified motivated action is guided by an underlying value of the behaviour (Deci & Ryan, 2000). *Controlled* motivation on the other hand, can be *externally* motivated, if an individual feels pressure from others, or *introjected* motivated, if they feel internally pressured to avoid negative feelings (Deci & Ryan, 2000). Lastly, *amotivation* is the overall lack of motivation. In general, people are more likely to perform a behaviour if they feel autonomously motivated to do so, rather than when feeling controlled (Deci & Ryan, 2000). According to Deci and Ryan (1991), level of self-determination can be seen on a continuum (Relative Autonomy Index; RAI). Intrinsic motivation represents the highest level, identified motivation the second highest, followed by introjected motivation and further by external motivation. Amotivation constructs the lowest level of self-determination.

The applicability of the self-determination theory in the context of understanding climate-change distress has been demonstrated by past research. While higher levels of self-determination were previously associated with better emotional regulation, and thus less anxiety or distress by external events (Ryan & Deci, 2000), Villacorta et al. (2003) found more self-determination connected to more climate-change-concern. They explain more self-determination related to better integration of the experience and more adaptive functioning concerning environmental circumstances, such as, in the case of environmental deterioration, more altruistic concern for the own community (Villacorta et al., 2003). Hodgins and Knee (2002) specify further, that more self-determined functioning relates to openness, which encourages an interested and honest attitude towards reality, fostering an attitude of benevolence, unbiased and non-judgmental view on reality and its accompanying experiences. Less self-determined functioning is however related to defensiveness, encouraging a biased and prejudiced view on reality. Information not fitting with one's perception of own identity, creating cognitive dissonance, is experienced as threatening. One shows maladaptive emotions, defensive behaviours and thrives for avoiding feelings of discomfort. Therefore, higher levels of self-determination do not necessarily serve as protection from negative feelings. Ultimately, the experience of emotions is a prerequisite for integrating them (Hodgins and Knee, 2002). The difference between high and low levels of self-determination seems to be however, that those with high self-determination accept their negative

experiences, such as climate-change-anxiety and those with low self-determination tend to avoid it or feel "paralyzed" by it.

Pro-Environmental Behaviour

Using Krajhanzl's (2010) definition, pro-environmental behaviours (PEB) include less usage of energy and raw materials, as well as reduced waste production and pollution. Next to personality characteristics or personal attitudes, especially the level of self-determination plays an important role for performance of pro-environmental behaviour (Krajhanzl, 2010). Past studies demonstrated a connection between different levels of self-determination and several pro-environmental behaviours such as recycling, using sustainable products and energy conservation. More specifically, higher levels of self-determination related to more frequent pro-environmental behaviours (Pelletier et al., 1998; Séguin et al, 1998; Villacorta et al., 2003). Pelletier and Sharp (2007) further stated higher levels of self-determination to be associated with longer and more stable maintenance of pro-environmental behaviour over time (e.g., recycling for over 2 month), as well as higher numbers of behaviours exerted on a daily basis. Heightened self-determination further relates to carrying out more difficult pro-environmental behaviours and better integration of pro-environmental behaviour into lifestyle and self-identity. Lavergne et al. (2010) found lower levels of self-determination predicting less pro-environmental behaviour.

Climate-change-distress was also found connected to the degree of pro-environmental behaviour one carries out. Clayton (2020) suggested climate-change-anxiety to have a motivational function for performing pro-environmental behaviours. Climate-change-paralysis on the other hand, to have a demotivational function (Clayton, 2020). A survey by the APA in 2019 found people who experienced climate-change-anxiety, more than twice as likely (87%) to accentuate their motivation to perform pro-environmentally, than people who did not experience climate-change-anxiety (40%) (American Psychological Association, 2020). Subsequent research with a more stringent definition of "anxiety" in the climate-change context, did not find such a relationship between climate-change-anxiety and pro-environmental behaviour (Clayton & Karazsia, 2020). This can be seen as evidence for the need to distinguish between expressions of climate-change-distress. Therefore, this research will differentiate between an adaptive, such as climate-change-anxiety, and a non-adaptive expression, such as climate-change-paralysis. More specifically, more self-determined functioning is thought to relate to open and honest acknowledging of own climate-change-anxiety, facilitating a successful integration of the experience as well as due to its adaptive nature, increased pro-environmental behaviour. Less self-determined functioning is thought to

relate to defence, avoidance and numbing of information about environmental deterioration and therefore feeling paralyzed by climate-change. This in turn in thought to relate to less pro-environmental behaviour.

Present Research

The mediating roles of climate-change-anxiety and climate-change-paralysis for the relationship between self-determination and pro-environmental behaviour have in present combination not been explored yet. Therefore, this study investigates these mechanisms and aims at filling the gap in research. It is suggested that those experiencing climate-change-anxiety are more inclined to behave pro-environmentally. This may be caused by better integration of cognitive dissonance between external information about the environmental necessity for pro-environmental behaviour and their reflection about own present pro-environmental behaviour, due to an open and integrative attitude characteristic for people with high levels of self-determination. Since those experiencing climate-change-paralysis are thought to have lower levels of self-determination, the integration may not succeed as quickly and complete. The feeling of paralysis could be suggested to additionally numb the experience of dissonance and the psychological need for integration all together and ultimately connect to little or no pro-environmental behaviour. It has been hypothesized that climate-change-anxiety and climate-change-paralysis serve as mediators in the relationship between self-determination and pro-environmental behaviour. More specifically, more self-determination was thought to relate to more climate-change-anxiety, which in turn was thought to be associated with more pro-environmental behaviour. Lower scores on self-determination were hypothesised to relate to higher scores of climate-change-paralysis, which are in turn associated with less pro-environmental-behaviour.

Methods

Participants and Procedure

In total, a convenience sample of 179 subjects participated in the present cross-sectional questionnaire study. As 62 participants did not complete one or more questionnaires for unknown reasons, their data were excluded from the analysis. The final population therefore consisted of 117 participants of whom 25 identified with the male gender (21%), 88 with the female gender (75%), 3 as non-binary or with the third gender (3%) and 1 participant preferred not to elaborate on their gender (1%). The youngest participant indicated an age of 20 and the oldest one an age of 58. The mean age of the population is 24.97 years ($SD = 6.27$). When asked for their highest educational degree 56% ($n = 65$) of the population indicated "Bachelor's degree", 27% ($n = 32$) indicated "High School degree", 15% (n = 18)

have achieved a "Master's Degree" and lastly, 2% ($n = 2$) have a higher degree than the ones mentioned above. The participants age-range was wide however which allows a generalization of the results to all age-ranges. The current sample size exceeds the a priori one of 99 (G-Power, effect size f = .15, alpha = .05, desired power = .90, number of predictors = 3; Faul et al., 2009).

Prior to the distribution among participants, the survey was handed in for approval to the ethical committee. Participants were recruited via social media networks (e.g., WhatsApp, Instagram, LinkedIn) and partaking was voluntary and non-compensated. At the beginning of the online survey, patients were presented with an information letter (Appendix A), which gave insight into the purpose of the study. Then, an informed consent form (Appendix B) had to be read and agreed upon, to proceed to the questionnaires. Patients were then asked to indicate demographics (i.e., gender, age and educational degree) and then further directed to the GMS-28, CCAS, CCAP and PEBFI scales, which had to be filled out in the demonstrated order. In conclusion, the completion of the survey took around 10 minutes. The language of the survey was English. The online nature of the study impedes a clear conclusion about the patient's attention-quality throughout the questionnaire. The data was collected from 9th of February 2021 onwards for one and a half weeks, whereafter the online survey was closed for participation and the data downloaded.

Instruments

Self-Determination. The patient's level of self-determination was measured with the Global Motivation Scale (GMS-28; Guay et al., 2003; Appendix C). The scale contains 28 questions, which have to be rated by a seven-point-scale (1-7), where 1 indicates "does not correspond accordingly" and 7 indicates "corresponds completely". To assess autonomous motivation, an intrinsic motivation subscale with 12 items such as "In general, I do things because I like making interesting discoveries" and an identified motivation subscale with 4 items such as "In general, I do things in order to help myself become the person I am to be" were utilized. Controlled motivation was assessed with the external motivation subscale, containing 4 items as for example "In general, I do things in order to attain prestige", and the introjected motivation subscale with 4 items such as "In general, I do things because I force myself to do them". Sum-scores were calculated for each subscale, which were then summarised into a "Relative Autonomy Index" (RAI; Appendix C; Ryan & Deci, 2000), that was calculated with the according formula (RAI = -2*AM -1*CON +1*ID +2*IN). Higher global RAI scores indicate more self-determined motivation. Past literature has shown the

psychometric properties of the GMS-28 to be good (Guay et al., 2003). The internal consistency reliability in the prevalent sample was good (Cronbach's a =.865).

Climate-Change-Anxiety. Climate-change-anxiety was assessed by the Climate Change Anxiety Scale (CCAS; Clayton & Karazsia, 2020) which consists of 22 items (Appendix D). Items must be answered on a five-point scale, labelled as 1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, 5 = *always*. Participants had to rate their general climate-change-anxiety on 13 items, such as "I have nightmares about climate-change", their cognitive-emotional impairment by climate-change on 8 items such as "Thinking about climate-change makes it difficult for me to sleep" and their functional impairment because of climate-change on 5 items such as "My concerns about climate-change undermine my ability to work to my potential". Hereby some of the questions were applicable to more than one category. The individual sum-scores of all items were computed, scores ranging between 22 and 110, with a higher score indicating more climate-change-anxiety. The internal consistency reliability was calculated and found to be good (Cronbach's a = .853).

Climate-Change-Paralysis. The level of climate-change-paralysis was measure with the climate-change-paralysis scale (CCPS; Appendix E). Although CCP was conceptualized and discussed by Searle and Gow (2010), as well as Clayton and Karazsia (2020), to our knowledge no measurement instruments were developed. Hence, we developed the present climate-change-paralysis scale. It consists of nine items, that had to be rated on a five-point scale (1-5), where 1 signified *never,* 2 = *rarely*, 3 = *sometimes,* 4 = *often,* and 5 = *almost always*. All items were summed into a total score ranging from 9 to 45, with a higher score indicating a higher climate-change paralysis. On 5 items, participants had to rate their feelings, such as being hopeless and helpless as a consequence of climate-change. Four items measured the extent of feeling such as unable or indifferent when thinking about behaving more sustainably. The internal consistency reliability of all nine items was calculated and found acceptable (Cronbach's a = .792).

Pro-Environmental Behaviour. Participants were asked to complete the 12-item questionnaire "Pro-Environmental Behaviour Frequency Scale" (PEBFS; Appendix F). Inspired by Krajhanzl (2010), items such as "how often do you recycle?" or "how often do you use a refillable water bottle?" were rated on a five-point-scale (1-5), where 1 signified the lowest and 5 the highest PEB. Individual sum-scores were calculated and ranged from 12 to 60. The internal consistency reliability in the prevalent sample was calculated and appeared to be good (Cronbach's a = .840).

Processing and Analysing the Data

Descriptive statistics were calculated for all mentioned variables and demographical information was summarized. Then the correlations between the variables were calculated. Next, the SPSS macro tool PROCESS (Hayes, 2018) was used to conduct a serial mediation analysis with Mediation Model 6. In the mediation analysis itself, the PEBFS sum-scores served as the dependent variable, the RAI reflected the quantitative independent variable self-determination and the total scores of the CCAS and CCPS were used as mediators. Lastly, bootstrapping was performed to assess whether the three indirect effects were significantly different from 0.

Results

Descriptive Statistics

In Table 1, the descriptive statistics of the RAI, CCAS, CCPS and PEBFS variables are displayed. Next to the means, standard deviations and the ranges of the variables, their correlations are shown. As visible in Table 1, correlations between all variables, but CCPS and PEBFS, are significant. More specifically, correlational analysis indicated higher RAI scores associated with higher CCAS scores ($r = .198$, $p < .05$) as well as higher PEBFS scores ($r = .185$, $p < .05$). Lower RAI scores were associated with higher CCPS scores ($r = -.186$, $p < .05$). Higher CCAS scores were furthermore related to higher PEBFS scores ($r = .403$, $p < .01$). Lastly, the correlation between CCPS and PEBFS ($r = .016$, $p > .05$) was found non-significant.

Table 1

Mean (M), Standard Deviation (SD), Range and Correlations for RAI, CCAS score, CCPS score and PEBFS score are given below

|	*M*	*SD*	Range	RAI	CCAS	CCPS	PEBFS
RAI	94.14	27.12	28 -196		.198*	-.186*	.185*
CCAS	52.91	11.29	22-110			.379**	.403**
CCPS	23.62	6.21	9-45				.016
PEBFS	38.94	7.35	12-60				

*p < .05 (2-tailed).

**p <.01 (2-tailed).

Serial Mediation Analysis

The total effect of self-determination (RAI) on pro-environmental behaviour (PEBFS) is made visible in Figure 1 ($c = 0.05$, $p = .037$). It furthermore illustrates the divided total effects into direct effect of RAI scores on PEBFS scores and its indirect effect via the

mediators CCAS and CCPS. The direct effect of RAI score on PEBFS score was shown to be non-significant ($c' = 0.02$, $p = .431$). As shown by the bootstrapping procedure, the first indirect effect, namely, level of self-determination to pro-environmental behaviour, through climate-change-anxiety ($a_1b_1 = 0.025$) differs significantly from 0 (95% CI [0.005, 0.049]). The second indirect effect, self-determination level to pro-environmental behaviour, through climate-change-paralysis ($a_2b_2 = 0.012$) does not however (95% CI [-0.005, 0.031]).

Figure 1

Serial Mediation Model for the Association of Self-Determination and Pro-Environmental Behaviour, Mediated by Climate-Change-Anxiety and Climate-Change-Paralysis
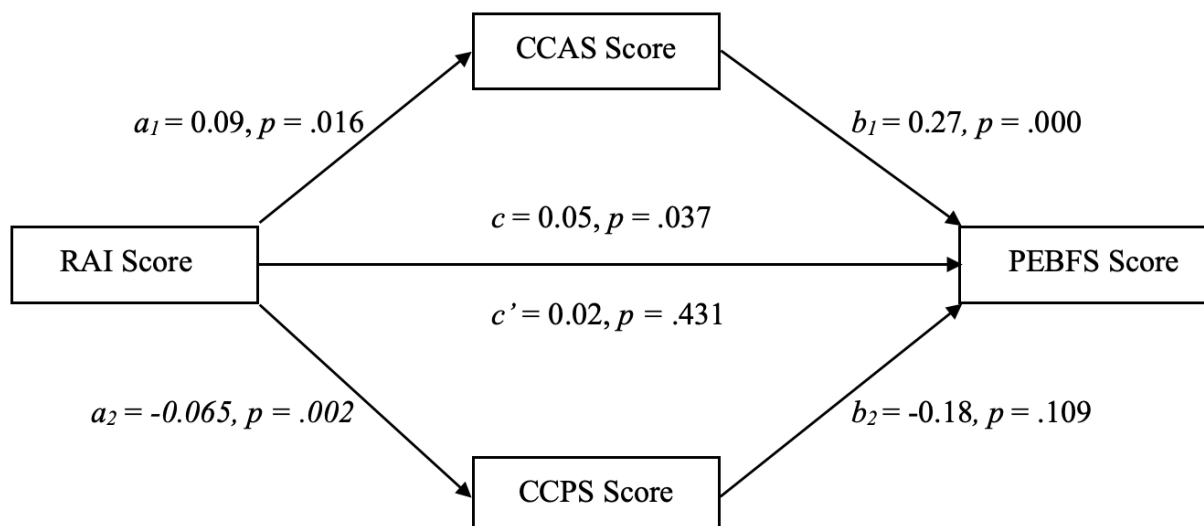
Note. Total effect (c) and indirect effect (c') of level of self-determination (RAI) on pro-environmental behaviour (PEBFS), through both climate-change-anxiety (CCA) and climate-change-paralysis (CCP). For all paths, unstandardized regression coefficients and related p-values are shown.

Discussion

This study investigated the mediating functions of climate-change-anxiety and climate-change-paralysis in the relationship between self-determination and pro-environmental behaviour. Previous literature showed climate-change to have drastic consequences not only for the environment but also for the mental health of a growing number of people (Clayton, 2020; Morganstein & Ursano, 2020). After closer examination of this climate-change-concern, it could be divided into climate-change-anxiety and climate-change-paralysis. Whereas climate-change-anxiety is an extreme worry about climate-change,

climate-change-paralysis is an apathic and numb attitude caused by the awareness of overwhelming environmental degradation (Albrecht, 2011; Clayton & Karazsia, 2020). Based on the literature, level of self-determination was suggested to relate to the respective expression of climate-change-concern (Villacorta et al., 2003; Hodgins & Knee, 2002), which was in turn suggested to connected to the level of pro-environmental behaviour one exerts (Clayton, 2020). Confirming our first hypothesis, the present research showed higher levels of self-determination to be related to higher levels of climate-change-anxiety, which in turn related to higher levels of pro-environmental behaviour. These results are in line with prior mentioned findings by Villacorta et al. (2003), who illustrated the prevalent relation between heightened self-determination and an increased climate-change-anxiety. The present results are furthermore in accordance with Clayton's (2020) indication of a connection between higher climate-change-anxiety and heightened pro-environmental behaviour. This study can thus be seen as an integration of the findings by Villacorta et al. (2003) and Clayton (2020).

In contrast to climate-change-anxiety, climate-change-paralysis was based on the findings by Hodgins and Knee (2002), thought to be associated with lower levels of self-determination. Lavergne et al. (2010) furthermore indicated its relation to less pro-environmental behaviour. Self-determination level scores were, as hypothesized, negatively correlated with climate-change-paralysis scores, supporting the prior assumption. However, scores on climate-change-paralysis did not show a significant association with scores on pro-environmental behaviour. Therefore, Clayton's (2020) suggestion of a relationship between higher levels of climate-change-paralysis and lower levels of pro-environmental behaviour, could not be supported by this study. In the following, two alternative explanations for these non-conform results will be illustrated.

The first one focuses on the prior division of climate-change-distress into an adaptive and a non-adaptive response to climate-change. Based on the literature, those experiencing climate-change-anxiety are able to openly approach, analyse and cope with their experience, which gives rise to a change in perception and ultimately integration of experience (Hodgins & Knee, 2002). Therefore climate-change-anxiety was found to be a rather adaptive response to climate-change. The accompanying inclination of behaving more pro-environmentally (Clayton, 2020) was also assessed as an adaptive way of dealing with climate-change. The defensive attitude of non-acceptance and hence non-integration of the experience of distress (Hodgins & Knee, 2002), prevalent in climate-change-paralysis, was found non-adaptive in comparison. Its following inclination for less pro-environmental behaviour (Clayton, 2020) was also seen as a non-adaptive response to climate-change. As those experiencing climate-

change-paralysis in the present sample do not necessarily exert less pro-environmental behaviour, the assumption that climate-change-paralysis is a less adaptive psychological as well as behavioural response to climate-change may have been unfitting, however. More specifically, since climate-change-paralysis does not necessarily relate to less pro-environmental behaviour, it could be thought that its underlying denial or avoidance could in some cases very well be adaptive.

On this note, Verplanken and Roy (2013) emphasized the self-protective mechanism, behaviours such as denial or suppression may have for the adaptive process. Climate-change-paralysis could therefore be seen as such a denying or suppressing response. Of importance is, according to Reser et al (2012), whether one acknowledges the own paralysing experience in this process. It could be suggested that if the own climate-change-paralysis is accepted, individuals may change their experience and behave accordingly in a pro-environmental manner. If it is not accepted however, individuals may not enter an adaptive process, nor exert adaptive behaviours such as pro-environmental behaviours. Thus, it could be speculated that in the present sample, part of the population who indicated experiencing climate-change-paralysis recognized and accepted their condition, while the other part did not. This division between those who acknowledge their climate-change-paralysis and those who did not, may then further explain the non-uniform degree of PEB the participants exerted.

Secondly, not only the own experience of climate-change-paralysis may have been failed to be acknowledged, but climate-change as a construct itself. Hodgins and Knee (2002) proposed a connection between low levels of self-determination and the way one perceives the self and reality. Here, an individual regulates its experiences by denying or avoiding information or events that contradict the own constructed reality, which the researchers described as ego-invested self-structure. Therefore, one either clings to reality, in case it supports ego-invested self-structure or rejects it entirely in case it diverges from the constructed reality. The consequence seems to be a cognitive defence through selective memory and information processing, as well as self-serving attribution-biases. Defensive behaviours may include lack of remorse for faulty behaviour or avoiding its consequences (Hodgins & Knee, 2002). In the present study, part of those experiencing climate-change-paralysis may, based on their generally lower level of self-determination, be prone to have developed an ego-invested self-structure in the past. This in turn may lead to denying not only one's own paralysis but also climate-change as a construct, as it may not be fitting with one's own reality. For those individuals, pro-environmental behaviour may not be of any value, as it does not fit with their chosen reality of a non-existing climate-change.

Implications

Climate-change is of progressive nature (Watts et al., 2019), as is the global spread of accessible information about it (Whitmarsh & Capstick, 2018). The present study explored the accompanying rise of mental health issues (American Psychological Association, 2018), as well as behavioural inclinations, such as pro-environmental behaviours. While climate-change-anxiety is, in comparison to climate-change-paralysis seen as more adaptive, both demonstrate a stressful experience for those suffering from them. Considering that psychological problems associated with climate-change have been called the "biggest pop-culture trend" in 2019 (McGinn, 2019), with a rather rising tendency since then (Gibson et al., 2020), the present findings have anew not only risen awareness in the matter, but also explored variables related to them. Considering that self-determination has been shown to relate in high levels to a more adaptive coping with climate-change than in low levels, clinicians are encouraged to foster higher self-determination in their patients. This could be achieved by utilizing an *autonomy-supportive approach* to therapy, which focuses on integrating negative emotions by creating a good therapeutic alliance in a client-centered environment (Roth et al., 2019). Focusing on non-judgmental, open acceptance and reflection of own emotions in *acceptance and commitment therapy* (Hayes et al., 2005) was also found supportive for development of high self-determination (Roth et al., 2019).

Limitations

The present study had several limitations. The cross-sectional design of this study excluded the possibility of determining directionality and causality of the presented relationships between the variables. Villacorta et al. (2003) indicated a reciprocal relationship between self-determination level and the experienced climate-change-distress. Therefore, self-determination level is suggested to relate to the kind of climate-change-distress experienced (climate-change-anxiety or climate-change-paralysis), which in turn may anew relate to the level of self-determined motivation to behave pro-environmentally. Investigating the reciprocal connection in a longitudinal study, could give insight into directionality of the variables.

The online nature of this study reflects a further limitation, as participants were able to choose the time and location of the study themselves. Therefore, it is not clear whether they chose a circumstance in which they were able to attend the questionnaire fully und undistracted, as well as whether they were primed with anything beforehand. Such a priming-factor could consist for example of medial exposure to either drastic ecological circumstances or their down-playing. Research by Pihkala (2019) as well as Whitmarsh & Capstick (2018)

found the media to play a fundamental role in shaping the individual's perception of climate-change and eliciting feelings of threat and ultimately climate-change-distress. Pelletier and Sharp (2008) further suggested that the manner environmentally related messages are framed, connects to their motivation to subsequently perform pro-environmentally. Concludingly, media consumption might have been a priming factor in the present population, that should in future studies be excluded through conduction of the questionnaire in a laboratory setting. Finally, it must be mentioned that the population predominantly consisted of females in a relatively uniform age-range (see Methods), which impedes a generalization of the present outcomes to the general population.

Future Research

Roth et al.'s (2019) model of integrative emotion regulation, based on the self-determination theory (Ryan & Deci, 2017), suggests integrative emotion regulation, comparable to highly self-determined functioning, beneficial for personal well-being and volitional functioning. Controlled and amotivated emotion regulation, and thus low self-determined functioning, is in comparison assessed as non-beneficial. Under consideration of this model and the earlier alternative explanations, it might be suggested that climate-change-paralysis relates to suppressive and dysregulated controlled or amotivated emotion regulation. It is recommended that future research addresses the underlying mechanism of climate-change-paralysis and investigates whether acceptance and degree of emotional regulation of own paralyzing experience connects to degree of pro-environmental behaviour. Furthermore, treatment of climate-change-distress and especially fostering of high levels of self-determination and thus successful integration of climate-change related negative emotions must be subject of future experimental research. It is recommended, to explore the proposed therapeutic interventions for climate-change-anxiety and -distress, in comparison to treatment as usual for distress- and anxiety-responses (e.g., CBT; National Institute for Health and Care Excellence [NICE], 2013) and no treatment at all.

Conclusion

This study contributes to a rather new body of literature about mechanisms involved in the relationship between self-determination, pro-environmental behaviour and psychological distress caused by environmental deterioration such as climate-change. The results indicate climate-change-anxiety but not climate-change-paralysis to be an underlying mechanism in the relationship between level of self-determination and pro-environmental behaviour. Our findings suggest higher self-determination to be connected to the more adaptive psychological experience of climate-change-anxiety, further related to more pro-environmental behaviour,

while lower self-determination connects to a less adaptive climate-change-paralysis, that did not relate to pro-environmental behaviour. Taken together, this research proposes a new concept of mental health issues associated with climate-change, as well as the importance of self-determination in fostering a more adaptive experience and functioning, such as pro-environmental behaviour.

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Appendices

Appendix A

Participant Information Letter

"Self-Determination Theory, Climate Chance Anxiety and Climate Change Paralysis:

An Exploration into Motivation for Pro-Environmental Behaviours"

26.12.2020

Dear participant,

First of all, thank you for your possible participation in this research!

What it is about

In the department Clinical Psychology at Utrecht University, we study the role of emotion regulation in psychological well- and ill-being. More specifically for this research, the underlying role of self-determination in pro-environmental behaviour. Also, the underlying role of climate chance anxiety and climate change paralysis are taken into account. This research can be very informative to further theoretical development and e.g., quality of psychological treatments. The data of this research are used in a Master-Thesis, follow-up research and could eventually lead to a publication of a scientific article.

How the data is collected and what we invite you to do

We will first ask some background information such as gender, age, educational level and country of origin. Furthermore, we ask you to fill in a couple of questionnaires concerning level of self-determination; climate change anxiety; climate change paralysis; pro-environmental behaviour. Participation will take about 20 minutes.

Possible advantages or disadvantages

We consider filling in these questionnaires not to be burdensome or emotionally stressful. In case the themes do evoke unpleasant feelings, you can contact the research team (see below), your general practitioner or www.deluisterlijn.nl for an (anonymous) telephone or chat.

Voluntary participation

Participation is voluntary and can be terminated at any time, without giving reasons and without consequences. The data that was collected up to that point may be used, unless you explicitly state otherwise.

Reward

Unfortunately, we are not able to reward you for your participation.

Personal data & Privacy

The data will be treated as confidential and will be anonymized in accordance with the highest safety regulations. Only the researchers involved have access to the data. The little personal information gathered (e.g., age, gender, …) cannot be traced back to you as a person. Data will be stored for at least 10 years in accordance with the guidelines provided by the VSNU Association of Universities in the Netherlands (www.vsnu.nl). If you leave your personal data at the end of the survey (e.g., for the possible reward or because you want to be kept informed about the results), these personal data will be stored on a different computer than the survey data itself.

For more information about privacy, we refer to this website:

https://autoriteitpersoonsgegevens.nl/nl/onderwerpen/avg-europese-privacywetgeving

Independent contact and complaints officer

If you have any questions, comments or complaints about the study, you can contact the researcher (see below) or Bart Neyrinck (b.a.m.neyrinck@uu.nl) not directly involved in the study. If you have an official complaint about the study, you can send an email to the complaints officer at klachtenfunctionaris-fetcsowet@uu.nl .

If, after reading this information letter, you decide to take part in the research, we kindly ask you to give your consent below.

With kind regards,

Nina Neuenhaus (n.neuenhaus@students.uu.nl; +49 178 1598951)

Bart Neyrinck, docent and supervisor of this research (b.a.m.neyrinck@uu.nl)

Appendix B

Consent statement

I hereby declare that I have read the information letter about "Self-Determination Theory, Climate Chance Anxiety and Climate Change Paralysis: An Exploration into Motivation for Pro-Environmental Behaviours".

I am sufficiently informed about the purpose of the study, as well as the manner the data is collected and handled.

I am sufficiently informed that I can quite this study at any point in time, without further explanation or consequences.

(BOX) I confirm

Appendix C

Global Motivation Scale (GMS-28)

(Guay et al.2003)

<u>**GENERAL ATTITUDES**</u>

Indicate to what extent each of the following statements corresponds generally to the reasons why you do different things.

Does not correspond accordingly		Corresponds moderately				Corresponds completely
1	2	3	4	5	6	7

IN GENERAL, I DO THINGS . . .

1. ... in order to feel pleasant emotions.	1	2	3	4	5	6	7
2. ... because I do not want to disappoint certain people.	1	2	3	4	5	6	7
3. ... in order to help myself become the person I aim to be.	1	2	3	4	5	6	7
4. ... because I like making interesting discoveries.	1	2	3	4	5	6	7
5. ... because I would beat myself up for not doing them.	1	2	3	4	5	6	7
6. ... because of the pleasure I feel as I become more and more skilled.	1	2	3	4	5	6	7
7. ... although I do not see the benefit in what I am doing.	1	2	3	4	5	6	7
8. ... because of the sense of well-being I feel while I am doing them.	1	2	3	4	5	6	7
9. ... because I want to be viewed more positively by certain people.	1	2	3	4	5	6	7
10. ... because I chose them as means to attain my objectives.	1	2	3	4	5	6	7
11. ... for the pleasure of acquiring new knowledge.	1	2	3	4	5	6	7
12. ... because otherwise I would feel guilty for not doing them.	1	2	3	4	5	6	7
13. ... for the pleasure I feel mastering what I am doing.	1	2	3	4	5	6	7
14. ... although it does not make a difference whether I do them or not.	1	2	3	4	5	6	7
15. ... for the pleasant sensations I feel while I am doing them.	1	2	3	4	5	6	7
16. ... in order to show others what I am capable of.	1	2	3	4	5	6	7
17. ... because I chose them in order to attain what I desire.	1	2	3	4	5	6	7
18. ... for the pleasure of learning new, interesting things.	1	2	3	4	5	6	7
19. ... because I force myself to do them.	1	2	3	4	5	6	7
20. ... because of the satisfaction I feel in trying to excel in what I do.	1	2	3	4	5	6	7
21. ... even though I do not have a good reason for doing them.	1	2	3	4	5	6	7
22. ... for the enjoyable feelings I experience.	1	2	3	4	5	6	7
23. ... in order to attain prestige.	1	2	3	4	5	6	7
24. ... because I choose to invest myself in what is important to me.	1	2	3	4	5	6	7

Does not correspond accordingly		Corresponds moderately				Corresponds completely
1	2	3	4	5	6	7

IN GENERAL, I DO THINGS . . .

25. ... for the pleasure of learning different interesting facts.   1 2 3 4 5 6 7

26. ... because I would feel bad if I do not do them.   1 2 3 4 5 6 7

27. ... because of the pleasure I feel outdoing myself.   1 2 3 4 5 6 7

28. ... even though I believe they are not worth the trouble.   1 2 3 4 5 6 7

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SCORING KEYS

GMS-28

# 4, 11, 18, 25	Intrinsic motivation - to know
# 6, 13, 20, 27	Intrinsic motivation - toward accomplishment
# 1, 8, 15, 22	Intrinsic motivation - to experience stimulation
# 3, 10, 17, 24	Extrinsic motivation - identified
# 5, 12, 19, 26	Extrinsic motivation - introjected
# 2, 9, 16, 23	Extrinsic motivation - external regulation
# 7, 14, 21, 28	Amotivation

Formula for calculating Relative Autonomy index (Ryan & Deci, 2000):

$RAI = -2*AM -1*CON +1*ID +2*INT$

Appendix D

Climate Change Anxiety Scale (Clayton & Karazsia, 2020)

Please rate how often the following statements are true for you.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Almost always

1. Thinking about climate change makes it difficult for me to concentrate.
2. Thinking about climate change makes it difficult for me to sleep.
3. I have nightmares about climate change.
4. I find myself crying because of climate change.
5. I think "why can't I handle climate change better?"
6. I go away by myself and think about why I feel this way about climate change.
7. I write down my thoughts about climate change and analyse them
8. I think, "why do I react to climate change this way?"
9. My concerns about climate change make it hard for me to have fun with my family or friends.
10. I have problems balancing my concerns about sustainability with the needs of my family.
11. My concerns about climate change interfere with my ability to get work or school assignments done.
12. My concerns about climate change undermine my ability to work to my potential.
13. My friends say I think about climate change too much.
14. I have been directly affected by climate change.
15. I know someone who has been directly affected by climate change.
16. I have noticed a change in a place that is important to me due to climate change.
17. I wish I behaved more sustainably.
18. I recycle.
19. I turn off lights.
20. I try to reduce my behaviour that contributes to climate change.
21. I feel guilty if I waste energy.

22. I believe I can do something to help address the problem of climate change.

Note: Items 1-13 constitute the climate change anxiety scale. Item 1-8 represent cognitive-emotional impairment; 9-13 measure functional impairment; 14-16 measure experience of climate change; 17-22 measure behavioral engagement.

Internal reliability for the emotions was 0.93 (study 1) and 0.92 (study 2). All items were measured on a 1-5 scale.

Appendix E

Climate Change Paralysis Rating Scale

Please rate how often the following statements are true for you.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Almost always

When I think about climate change, I feel:

1. Hopeless
2. Helpless
3. Powerless
4. Overwhelmed
5. Guilt

When I think about behaving more sustainably, I feel:

1. Overwhelmed
2. Unable
3. Indifferent
4. Ridicules, as my impact is way too small to make a difference

Appendix F

Pro-Environmental Behaviour Frequency

Please rate how often the following statements are true for you.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Almost always

How often do you:

1. Recycle
2. Reduce your water use
3. Reduce eating meat
4. Reduce eating animal-based products (other than meat)
5. Reuse old products instead of buying new ones
6. Buy clothes of pro-environmental brands
7. Buy organic products
8. Save energy
9. Avoid flying
10. Use less plastic packaging
11. Use a refill water bottle

"Looking back at your pro-environmental behaviour of the last few weeks, to what degree do you feel that you were able to fulfil your intentions?"