

Facing climate change: the mediating role of pro-ecological behaviour between climate anxiety and psychological adaptation


W obliczu zmian klimatu: mediacyjna rola zachowań proekologicznych pomiędzy lękiem klimatycznym i adaptacją psychologiczną

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Abstract

Introduction and objective: The construct of climate anxiety has emerged in response to ongoing climate change. It refers to an emotional reaction to a directly experienced or perceived threat from climate change, which can be considered an adaptive mechanism. Factors underlying the severity of perceived climate anxiety include, among others, individual resources, with psychological resilience recognised as a key component in climate change adaptation. At the same time, pro-environmental behaviour, which in its definition focuses on environmental well-being, can be related to global climate change and its impacts. The aim of this study was to explore the mediating role of pro-ecological behaviour between climate anxiety and psychological resilience. **Materials and methods:** The study was conducted online and utilised three questionnaires among 431 participants. The questionnaires used in the study were: the Polish adaptation of the Climate Anxiety Scale, the KOP-26 Resilience Measure Questionnaire, and a self-report questionnaire on pro-environmental behaviour. **Results:** The analysis confirmed the hypothesis, revealing a significant mediating effect of pro-ecological behaviour between climate anxiety and psychological resilience. The results indicate a negative direct correlation between climate anxiety and psychological resilience. **Conclusions:** Psychological well-being, in the context of progressing climate change, needs to be addressed. Maintaining a high level of psychological resilience appears crucial in these circumstances, with pro-ecological behaviour enhancing well-being when incorporated into daily life. That suggests that pro-ecological behaviour may serve as an effective coping mechanism in the face of climate change.

Keywords: resilience, climate change, climate anxiety, pro-ecological behaviour, psychological adaptation

Streszczenie

Wprowadzenie i cel: Konstrukcja lęku klimatycznego powstała w obliczu zachodzących zmian klimatu – odnosi się do emocjonalnej reakcji na bezpośrednio doświadczane lub postrzegane zagrożenie związane ze zmianami klimatu, którą można uznać za mechanizm adaptacyjny. U podstaw nasilenia odczuwanego lęku klimatycznego leżą m.in. posiadane zasoby, a prężność psychiczna jest uznawana za istotny czynnik w procesie adaptacji do zmian klimatu. Jednocześnie zaangażowanie w zachowania proekologiczne, które w swojej definicji koncentrują się na dobrostanie środowiska, może być związane z globalnymi zmianami klimatu i ich skutkami. Celem badania było sprawdzenie mediacyjnej roli zachowań proekologicznych między lękiem klimatycznym a prężnością psychiczną. **Materiał i metody:** Badanie zostało przeprowadzone online z wykorzystaniem trzech kwestionariuszy, z udziałem 431 osób. W badaniu uwzględniono polską adaptację Skali Lęku Klimatycznego, Kwestionariusz Oceny Odporności KOP-26 oraz kwestionariusz samoopisowy dotyczący zachowań proekologicznych. **Wyniki:** Przeprowadzona analiza potwierdziła hipotezę i ujawniła mediacyjną rolę zachowań proekologicznych między lękiem klimatycznym a prężnością psychiczną. Wyniki wskazują na ujemną bezpośrednią korelację między lękiem klimatycznym a prężnością psychiczną. **Wnioski:** W czasach postępujących zmian klimatu należy zwrócić uwagę na dobrostan psychiczny. Utrzymanie wysokiego poziomu prężności psychicznej wydaje się kluczowe w danych

okolicznościach. Należy przy tym uwzględnić rolę zachowań proekologicznych, które wzmacniają dobrostan, będąc włączonymi w styl życia. Sugeruje to, że zachowania proekologiczne mogą służyć jako skuteczny mechanizm obronny w obliczu zmian klimatu.

Słowa kluczowe: prężność psychiczna, zmiany klimatu, lęk klimatyczny, zachowania proekologiczne, adaptacja psychologiczna

INTRODUCTION

Global climate changes pose a risk to psychological well-being (Doherty and Clayton, 2011) and affect psychological functioning, manifesting as decreased mood, impaired cognitive performance, or increased risky behaviour (American Psychological Association, 2021b; Gawrych, 2022). Natural disasters and experienced stress can lead to various mental health issues (i.e. Galea et al., 2005; Gawrych, 2022; Nicholas et al., 2020). Higher temperatures are associated with increased rates of psychological problems (Vida et al., 2012). Beyond direct effects, climate change can also have an indirect impact on individuals (Doherty and Clayton, 2011). Concepts such as “climate stress” or “climate anxiety” describe emotional responses to perceived or experienced implications of climate change. “Climate stress” refers to the intensity and severity of emotional responses to climate change’s implications (Clayton et al., 2014, as cited in Budziszewska and Kałwak, 2022). Within this framework, “climate anxiety” is considered part of “climate stress,” since it refers to a negative emotional response in the face of climate change and its consequences (Pihkala, 2019; Wullenkord et al., 2021). Altogether, the literature highlights a significant prevalence of worry about the climate situation (Hickman et al., 2021), especially among young people (Clayton and Karaszia, 2020; American Psychological Association, 2021a, 2021b), given that the occurring changes are global and involve a tangible threat (Clayton, 2020; Doherty and Clayton, 2011). It is also important to emphasise the ongoing progression of universally visible climate change (Core Writing Team, Lee and Romero, 2023).

Climate anxiety is considered an adaptive reaction (Verplanken and Roy, 2013), suggesting a potential resilient response in the face of adversity, as in climate change. While a certain level of worry seems reasonable in those circumstances, simple adaptation may not suffice, since climate

change is progressing (Clayton, 2020). Adaptive actions to address climate change are considered key resources in this regard (Nicholas et al., 2020) – the recognised protective factors of climate anxiety include psychological resilience, being especially beneficial when facing adversity (Rutter, 1987, as cited in Um et al., 2014, p. 260). Resilience is understood both as a set of protective factors and effective coping mechanisms in adverse conditions (Gašior et al., 2016), as well as the outcome of coping strategies reflected in adaptation and positive functioning following adversity or a challenge (Sigley-Taylor et al., 2021). Many determinants contribute to resilience and thus individual vulnerability to stress (Wood and Bhatnagar, 2015). Thereby, stressors promoting resilience in some people may result in increased vulnerability in others (Osório et al., 2017). Luthar et al. (2000) suggest that severe adversity needs to occur to speak of resilient results afterwards. Thus, in the context of adversity like climate change, resilience may facilitate adaptation and help reduce negative emotions.

Anxiety about climate change is linked to behavioural engagement (Clayton and Karaszia, 2020), often motivated by a desire to adopt climate-friendly behaviours (American Psychological Association, 2020). Environmentally-friendly behaviour is “promoting environmental quality” (APA Dictionary of Psychology: Proecological behavior, cited 2023). While environmental concern is at a fairly high level (Ellen, 1994), engagement in pro-ecological behaviour depends on multiple factors, i.e. climate knowledge, cognitive openness, and reliance on science (Tucholska and Gulla, 2022). Similar to climate anxiety, pro-ecological actions may serve an adaptive role, fostering a greater sense of control (Verplanken and Roy, 2013).

As previously mentioned, climate change is a stressful occurrence (American Psychological Association, 2021a). Prior studies indicate a negative correlation between resilience and stress scores (Zhang et al., 2021), suggesting a potential similar trend for climate anxiety. Pro-ecological

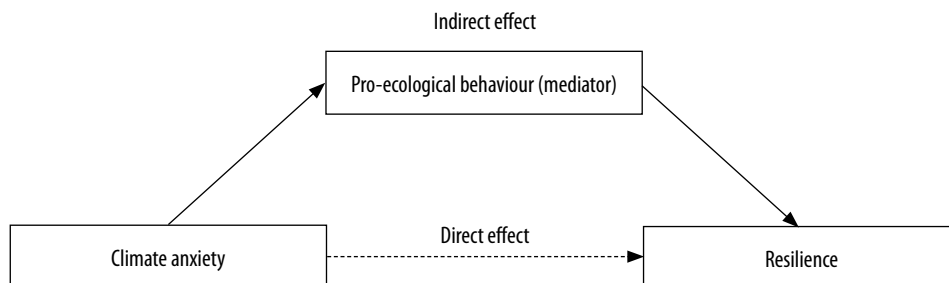


Fig. 1. Mediation hypothesised in the study

behaviour, as an adaptive mechanism, may lead to increased sense of control (Verplanken and Roy, 2013). Consequently, it is expected to have a mediating role between the other two variables. This implies that individuals with greater resilience might experience lower levels of climate anxiety, consistent with earlier findings (Schwaab et al., 2022).

The primary hypothesis explored whether the relationship between climate anxiety and psychological resilience is mediated through pro-ecological behaviour (Fig. 1). In this study, resilience is understood as the ability to cope with adversity. Climate anxiety refers to a negative emotional reaction to climate change, while pro-ecological behaviour relates to environmental protection, sustainable use of natural resources, and actions intended to reduce the negative impact of human activity on the environment.

METHODS

Three questionnaires were employed in the study. The Polish adaptation of the Climate Anxiety Scale (Larionov et al., 2022) was used to measure climate anxiety. It consists of 13 questions. Responses are given on a five-point scale: never, rarely, sometimes, often, almost always. The scale meets psychometric requirements.

Psychological resilience was assessed using the KOP-26 Resilience Measure Questionnaire. It demonstrates good reliability with Cronbach's alpha of 0.81 (Gąsior et al., 2016). The questionnaire includes 26 items, with responses rated on a five-point scale (from "completely disagree" to "completely agree").

To measure pro-ecological behaviour, a 13-item survey was made, with participants rating the relevance of statements on a five-point scale (from "usually not" to "usually yes"). The statements were selected by competent judges from a pool of 21 statements, including 14 items describing pro-environmental behaviour of individual's nature suggested by Ciężela (2019), five statements generated using artificial intelligence, and two items proposed by the authors. Six judges, all with university degrees in social sciences, evaluated the statements based on how well they described environmentally-friendly (pro-ecological) behaviour based on the definition: "behaviours related to environmental protection, sustainable use of natural resources, and actions intended to reduce the negative impact of humans on the environment". Judges also provided feedback on the items and made their own suggestions, which were subsequently evaluated by the authors. The procedure resulted in the selection of nine items and inclusion of four items proposed by judges – forming the final 13-item survey in Polish (Appendix 1). The scale meets psychometric requirements, with a Cronbach's alpha of 0.789.

The questionnaires showed good reliability in the study group. Cronbach's alpha for the KOP-26 was 0.929 ($M = 3.61$; $SD = 0.69$), for the Climate Anxiety Scale it was 0.878 ($M = 1.51$; $SD = 0.57$), and for the pro-ecological behaviour scale it was 0.789 ($SD = 0.62$).

1. I turn off the light when leaving the room I was in. [Gaszę światło, wychodząc z pomieszczenia, w którym byłem/am.]
2. I use energy-saving light bulbs. [Używam żarówek energooszczędnych.]
3. I separate my rubbish. [Segreguję śmieci.]
4. I use reusable bags. [Używam toreb wielorazowego użytku.]
5. I plant trees or take care of plants around my home or in public locations to increase green spaces. [Sadzę drzewa lub dbam o roślinność wokół mojego domu lub w miejscach publicznych, aby zwiększać zielone przestrzenie.]
6. I regularly save water by taking shorter showers, closing the tap while brushing my teeth, or collecting rainwater to water my plants. [Regularnie oszczędzam wodę poprzez krótsze prysznice, zakręcanie kranów podczas mycia zębów lub zbieranie deszczówki do podlewania roślin.]
7. I live according to the "less waste" idea, trying to re-use various materials. [Żyję zgodnie z zasadą *less waste*, starając się wykorzystać ponownie różne materiały.]
8. I reduce my meat consumption, replacing it with plant-based alternatives or following a vegetarian/plant-based diet. [Redukuję spożycie mięsa, zamieniając je na roślinne alternatywy lub przyjmując dietę wegetariańską/roślinną.]
9. I choose products with organic certification or from organic brands. [Wybieram produkty oznaczone certyfikatami ekologicznymi lub ekologicznymi marek.]
10. I choose products made of natural materials (e.g. clothing). [Wybieram produkty z naturalnych materiałów (np. odzież).]
11. I buy second-hand clothing or other items of daily use. [Kupuję używaną odzież lub inne artykuły codziennego użytku.]
12. I avoid shopping from "fast-fashion" brands and following microtrends. [Unikam zakupów w firmach *fast-fashion* oraz podążania za mikrotrendami.]
13. I try to avoid wasting food. [Staram się nie marnować żywności.]

Appendix 1. Items included in the survey for measuring pro-ecological behaviour, translated from Polish

Additionally the survey included a question to identify the sources from which participants receive information about climate change, allowing for multiple answers: (1) "radio/newspapers/television", (2) "social media", (3) "popular science literature", (4) "scientific literature (e.g. books, scientific journals)", (5) "I do not seek such information, this topic does not interest me".

Data was collected online via Google Forms from 13 June 2023 to 19 October 2023. Participants were recruited through social media shares and personal invitations, with participation restricted to individuals aged 18 and over. Participation in the study was voluntary, with initial assurances regarding data confidentiality and withdrawal options. All analyses were completed in jamovi, version 1.6.23 and 2.3.28.

PARTICIPANTS

Data was collected from 431 participants ($N = 431$). Of these, 306 were women (71%), 108 were men (25.1%), and 17 individuals identified as "other" (3.9%). The majority had completed secondary school education (52.2%), followed by those with a university degree (44.5%), vocational education (1.6%), primary education (1.4%), and middle school education (0.2%). Participants were aged 18–84 ($M = 23$; $SD = 12$). The largest age group was 23-year-olds (16%), followed by 22-year-olds (13.5%), and 19-year-olds (10.9%). Most participants resided in cities with populations over 150,000 people (33.2%), followed by cities with up to 150,000 inhabitants (20.6%), cities with up to 50,000 inhabitants (20.4%), villages (18.3%), and towns with up to 10,000 inhabitants (7.4%).

RESULTS

Several aspects of the given variables were analysed. The mediation analysis ($N = 431$) was conducted using a bias-corrected bootstrap method with 5,000 replications. It showed a negative direct effect of the magnitude of climate anxiety on resilience, which was -0.32 ($SE = 0.12$, 95% CI $[-0.56, -0.077]$, $z = -2.61$, $p = 0.009$), indicating that greater anxiety was associated with progressively lower resilience among respondents. The analysis also revealed an indirect effect of climate anxiety on resilience through mediation related to pro-environmental behaviour, estimated at 0.26 ($SE = 0.055$, 95% CI $[0.15, 0.38]$, $\beta = 0.10$, $z = 4.65$, $p < 0.001$). The indirect component centred on the relationship between climate anxiety and pro-ecological behaviour was 0.41 ($SE = 0.05$, 95% CI $[0.33, 0.50]$), statistically significant ($z = 8.31$, $p < 0.001$), while the indirect component related to pro-ecological behaviour and resilience was 0.62 ($SE = 0.11$, 95% CI $[0.39, 0.87]$), also statistically significant ($z = 5.62$, $p < 0.001$). The total effect of climate anxiety on resilience, including the indirect effect, was found to be statistically insignificant at -0.065 ($SE = 0.12$, 95% CI $[-0.29, 0.15]$, $z = -0.55$, $p = 0.584$), suggesting total mediation of the level of pro-ecological behaviour on the relationship between anxiety and resilience.

The analysis on sources of climate change information indicates that the majority of respondents (22.5%) receive it simultaneously from radio, newspapers, TV, and social media. The second-largest group of respondents (21.1%) reported receiving it exclusively from social media. Interestingly, 9.3% of participants exclusively selected the answer "I do not seek such information, this topic does not interest me".

DISCUSSION

The purpose of this study was to determine the mediating role of pro-ecological behaviour between climate anxiety and psychological resilience. The analysis suggests total mediation of the magnitude of pro-ecological behaviour in the relationship between climate anxiety and resilience, supporting the hypothesis. This indicates that increased climate anxiety, associated with heightened pro-ecological behaviour, further correlates with increased resilience. These findings align with previous research that identified resilience as a protective factor that can improve well-being in the face of adversity (Rutter, 1987, as cited in Um et al., 2014, p. 260). Given that climate change poses a real threat (Clayton, 2020; Doherty and Clayton, 2011), which is progressing over time (Core Writing Team, Lee and Romero, 2023), full adaptation may be impossible. Therefore, it appears reasonable to assume that the greater the experienced climate anxiety, the lower the resilience, which was confirmed by our research. Additionally, the link between anxiety and behavioural engagement (Clayton and Karazsia, 2020), viewed from the perspective of pro-ecological behaviour,

was confirmed. Psychological resilience, being part of the adaptive process (Sisto et al., 2019), is at least partially characterised in the cognitive aspect (Parsons et al., 2016), while cognitive changes are among important aspects for the development of pro-environmental behaviour (Gaspar, 2013). Therefore, its connection with behaviour seems reasonable. In the face of the growing threat of climate change, it is crucial to identify strategies that boost resources and reduce the negative impacts on mental health. This study sheds light on a potential solution to address this need. Engaging in pro-ecological behaviour can help promote resilience and further reduce anxiety linked to climate change.

The study also provides insights into sources of climate change information. It seems important to note that over 9% of participants expressed a lack of interest in this topic and do not seek information on this issue. Consequently, further research in this area is worth considering.

It is also important to acknowledge the limitations of this research. The majority of respondents were young adults, who are at a higher risk of experiencing climate anxiety (Clayton and Karazsia, 2020; American Psychological Association, 2021b), which may introduce bias. Conducted during the summer, the study's timing could have influenced the outcomes due to the increased risk of exposure to high temperatures – which are important for their impacts on mental health (i.e. Mann, 1998; Sher, 2020). Additionally, this study relied solely on self-report data, as only questionnaires were used.

For future research, we suggest exploration of climate anxiety, especially across different age groups, examining whether place of residence plays a significant role in the magnitude of experienced climate anxiety or resilience. Long-term research would provide a better understanding of the occurrence of climate anxiety and the role of climate events, seasonal changes, and individual adaptation or resilient responses. It would be valuable to look into responses to climate change in a more direct and quasi-experimental way, other than self-reported. Extending the approach to the topic is essential for gaining deeper insights into its occurrence.

Psychological resilience seems to be a crucial resource in times of climate change. Our analysis underscores the mediating role of pro-ecological behaviour between climate anxiety and resilience. Individuals experiencing climate anxiety who engage in pro-ecological behaviour report increased resilience, making it a successful coping mechanism.

Conflict of interest

The authors do not report any financial or personal connections with other persons or organisations which might negatively affect the content of this publication and/or claim authorship rights to this publication.

Author contribution

Original concept of study; critical review of manuscript; final approval of manuscript: KO. Collection, recording and/or compilation of data; writing of manuscript: BW, KO. Analysis and interpretation of data: BW.

References

- American Psychological Association: Addressing climate change concerns in practice. 2021a. Available from: <https://www.apa.org/monitor/2021/03/ce-climate-change> [cited: 29 October 2023].
- American Psychological Association: Majority of US adults believe climate change is most important issue today. 2020. Available from: <https://www.apa.org/news/press/releases/2020/02/climate-change> [cited: 22 October 2023].
- American Psychological Association: Urgent need to address mental health effects of climate change, says report. 2021b. Available from: <https://www.apa.org/news/press/releases/2021/11/mental-health-effects-climate-change> [cited: 22 October 2023].
- APA Dictionary of Psychology: Proecological behavior. Available from: <https://dictionary.apa.org/proecological-behavior> [cited: 29 October 2023].
- Budziszewska M, Kałwak W: Climate depression. Critical analysis of the concept. *Psychiatr Pol* 2022; 56: 171–182.
- Ciążela A: Zachowania proekologiczne studentów polskich uczelni. *Prakseologia* 2019; 161: 227–251.
- Clayton S: Climate anxiety: psychological responses to climate change. *J Anxiety Disord* 2020; 74: 102263.
- Clayton S, Karazsia BT: Development and validation of a measure of climate change anxiety. *J Environ Psychol* 2020; 69: 101434.
- Core Writing Team, Lee H, Romero J (eds.): Summary for Policymakers. In: *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC, Geneva 2023: 1–34. DOI: 10.59327/IPCC/AR6-9789291691647.001.
- Doherty TJ, Clayton S: The psychological impacts of global climate change. *Am Psychol* 2011; 66: 265–276.
- Ellen PS: Do we know what we need to know? Objective and subjective knowledge effects on pro-ecological behaviors. *J Bus Res* 1994; 30: 43–52.
- Galea S, Nandi A, Vlahov D: The epidemiology of post-traumatic stress disorder after disasters. *Epidemiol Rev* 2005; 27: 78–91.
- Gaspar R: Understanding the reasons for behavioral failure: a process view of psychosocial barriers and constraints to pro-ecological behavior. *Sustainability* 2013; 5: 2960–2975.
- Gawrych M: Climate change and mental health: a review of current literature. *Psychiatr Pol* 2022; 56: 903–915.
- Gąsior K, Chodkiewicz J, Cechowski W: Kwestionariusz Oceny Prężności (KOP-26). Konstrukcja i właściwości psychometryczne narzędzia. *Polskie Forum Psychologiczne* 2016; 21: 76–92.
- Hickman C, Marks E, Pihkala P et al.: Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey. *Lancet Planet Health* 2021; 5: e863–e873.
- Larionow P, Soltys M, Izdebski P et al.: Climate change anxiety assessment: the psychometric properties of the Polish version of the Climate Anxiety Scale. *Front Psychol* 2022; 13: 870392.
- Luthar SS, Cicchetti D, Becker B: The construct of resilience: a critical evaluation and guidelines for future work. *Child Dev* 2000; 71: 543–562.
- Mann JJ: The neurobiology of suicide. *Nat Med* 1998; 4: 25–30.
- Nicholas PK, Breakey S, White BP et al.: Mental health impacts of climate change: perspectives for the ED clinician. *J Emerg Nurs* 2020; 46: 590–599.
- Osório C, Probert T, Jones E et al.: Adapting to stress: understanding the neurobiology of resilience. *Behav Med* 2017; 43: 307–322.
- Parsons S, Kruijt AW, Fox E: A cognitive model of psychological resilience. *J Exp Psychopathol* 2016; 7: 296–310.
- Pihkala P: Climate Anxiety. MIELI Mental Health Finland, Helsinki 2019. Available from: <https://helda.helsinki.fi/handle/10138/307626>.
- Schwaab L, Gebhardt N, Friederich HC et al.: Climate change related depression, anxiety and stress symptoms perceived by medical students. *Int J Environ Res Public Health* 2022; 19: 9142.
- Sher L: The impact of the COVID-19 pandemic on suicide rates. *QJM* 2020; 113: 707–712.
- Sigley-Taylor P, Chin TC, Vella-Brodrick DA: Do subjective and objective resilience measures assess unique aspects and what is their relationship to adolescent well-being? *Psychol Sch* 2021; 58: 1320–1344.
- Sisto A, Vicinanza F, Campanozzi LL et al.: Towards a transversal definition of psychological resilience: a literature review. *Medicina (Kaunas)* 2019; 55: 745.
- Tucholska K, Gulla B: Kryzys klimatyczny w doświadczeniu indywidualnym. *Humanistyka i Przyrodoznawstwo* 2022; (28): 213–230.
- Um YH, Huh HJ, Kim SY et al.: Possible cultural effects on the increments of somatic symptoms in subjectively resilient depressed patients. *Asia Pac Psychiatry* 2014; 6: 259–266.
- Verplanken B, Roy D: “My worries are rational, climate change is not”: habitual ecological worrying is an adaptive response. *PLoS One* 2013; 8: e74708.
- Vida S, Durocher M, Ouarda TBMJ et al.: Relationship between ambient temperature and humidity and visits to mental health emergency departments in Québec. *Psychiatr Serv* 2012; 63: 1150–1153.
- Wood SK, Bhatnagar S: Resilience to the effects of social stress: evidence from clinical and preclinical studies on the role of coping strategies. *Neurobiol Stress* 2015; 1: 164–173.
- Wullenkord M, Tröger J, Hamann KRS et al.: Anxiety and climate change: a validation of the Climate Anxiety Scale in a German-speaking quota sample and an investigation of psychological correlates. *Clim Change* 2021; 168: 20.
- Zhang Z, Yan G, Sun C et al.: Who will adapt best in Antarctica? Resilience as mediator between past experiences in Antarctica and present well-being. *Pers Individ Dif* 2021; 169: 109963.