

Adulthood nature exposure and urban living are associated with climate policy support, mediated by climate change beliefs: A structural equation modeling study^{☆,☆☆,☆☆☆}

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ABSTRACT

This study examined whether higher adulthood nature exposure, childhood nature exposure, and rural (vs. urban) domicile predict climate policy support via self-nature connection and climate change beliefs. When testing this mediation, we controlled for sociodemographic variables. We used structural equation modeling with a representative sample of 478 respondents from Finland. After exploratory factor analyses, climate policy support was divided into two: resource- and infrastructure-focused support. We found that higher adulthood nature exposure and urban (vs. rural) domicile predicted stronger resource- and infrastructure-focused support, both directly and indirectly through stronger climate change beliefs; however, the direct paths from adulthood nature exposure and domicile to infrastructure-focused support were not robust under bootstrapping. In contrast, higher childhood nature exposure revealed only a direct association with weaker infrastructure-focused support, and not even this association was robust under bootstrapping. Contrary to our expectations, self-nature connection did not serve as a mediator. Of all the predictors and mediators, climate change beliefs showed the strongest direct associations with both types of climate policy support, particularly for resource-focused policies. The results of this correlational study underscore the potential importance of examining the causal directions of these associations in future research, thereby enhancing our understanding of how to mitigate climate change.

1. Introduction

Climate change is a threat to human well-being and planetary health (IPCC, 2023). To mitigate its adverse effects, some measures can be taken by all individuals (Usluer et al., 2023). Especially in rich Western countries that directly account for a significant proportion of greenhouse gas emissions, individuals can have an impact by engaging in pro-environmental behaviors and influencing governmental

decision-making (Syropoulos & Markowitz, 2024). In such democratic countries, broad public support is a critical driver of the development and implementation of climate policies (Anderson et al., 2017; Burstein, 2021). In addition, climate policy support (e.g., acceptance of carbon taxes) may lead to a positive cross-lagged (spillover) effect, increasing the likelihood of individuals reducing red meat consumption, an everyday pro-environmental behavior (Thøgersen et al., 2024). Thus, it is worth exploring what factors predict climate policy support (Bretter &

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Schulz, 2024). Among the various factors possibly shaping climate policy support, two relatively little studied yet potentially important predictors are adulthood nature exposure and childhood nature exposure.

Understanding the potential roles of nature exposure during adulthood and childhood as predictors of support for climate policies can benefit from insights found in the literature on pro-environmental behaviors. Although climate policy support reflects attitudes rather than behaviors, this body of literature is relevant for two main reasons. First, individuals who are more likely to engage in pro-environmental behaviors tend to express stronger support for climate policies, even after controlling for shared underlying predictors (Loy & Reese, 2019). Second, earlier research has shown that both adulthood and childhood nature exposure are associated with various pro-environmental behaviors (e.g., Alcock et al., 2020; Martin et al., 2020; Stehl et al., 2024). Examining the role of nature exposure in predicting climate policy support is, therefore, a logical next step. The following paragraphs provide a more detailed overview of these findings.

Adulthood and childhood nature exposure have been conceptualized in terms of time spent in natural surroundings (Alcock et al., 2020; Cleary et al., 2020), frequency of visits to green and blue spaces (Martin et al., 2020; Stehl et al., 2024), and the extent to which individuals subjectively take notice of natural environments (Wood et al., 2019). Greater nature appreciation and spending more recreational time in natural settings are related to increased pro-environmental behaviors (Alcock et al., 2020). Among young adults, higher levels of childhood nature exposure (experience) predict greater willingness to engage in pro-environmental behaviors (Van Heezik et al., 2021). Taken together, this body of evidence suggests that adulthood and childhood nature exposure may also serve as predictors of climate policy support, an example of a pro-environmental attitude.

There is also evidence that one pathway from higher nature exposure to stronger pro-environmental attitudes and behaviors is through higher nature connection (DeVillie et al., 2021). Nature connection has been defined in several interrelated ways: for example, as the extent to which an individual believes that they are part of the natural environment (Martin & Czellar, 2016; Schultz, 2002), or as a subjective sense of one's relationship with nature encompassing affective, cognitive, and experiential dimensions (Cleary et al., 2020). Nature connectedness (nature connection) moderated relationships between nature contact (exposure), well-being, and pro-environmental behaviors (Martin et al., 2020). Children's (previous) experience in nature predicts the extent of their interest in environmentally friendly practices both directly and indirectly through nature connection (Cheng & Monroe, 2012). Greater recalled childhood exposure to blue spaces predicts higher nature connection, which in turn predicts stronger pro-environmental behavior (Stehl et al., 2024). Indeed, this evidence corroborates separate studies reporting direct relationships between adulthood/childhood nature exposure and nature connection (Cleary et al., 2020; Van Heezik et al., 2021), between nature connection and environmental policy support (Gkargkavouzi et al., 2019), and between nature connection and pro-environmental behaviors (Davis et al., 2009; Whitburn et al., 2020; Zylstra et al., 2014). Thus, it would be reasonable to include nature connection as a mediator in considering the relationship between nature exposure and climate policy support.

Moreover, climate change beliefs—defined as the belief that climate change is real and caused by human activities—can be conceptualized as a second mediator positioned between nature connection and climate policy support. The latter part of this proposed pathway, from climate change beliefs to climate policy support, is well grounded in Value-Belief-Norm (VBN) theory (Stern et al., 1999) and is empirically supported by earlier research (Drews & Van Den Bergh, 2016; Hornsey et al., 2016). In contrast, the earlier segment (i.e., linking nature connection to climate change beliefs) has received less direct attention. However, its theoretical plausibility can be supported through the intermediary of the New Ecological Paradigm (NEP), which captures

individuals' pro-environmental worldviews from a cognitive perspective, that is, the extent to which they believe human activities harm nature (Dunlap et al., 2000; Perrin & Benassi, 2009). While our study did not include a measure of NEP, it is theoretically plausible to assume that individuals with a stronger nature connection would also show higher NEP endorsement, which in turn could lead to stronger climate change beliefs. Indeed, prior empirical studies have separately shown associations between nature connection and NEP endorsement (Martin & Czellar, 2016; Mayer & Frantz, 2004), and between NEP endorsement and climate change beliefs (Hornsey et al., 2016). This supports the possibility of a link between nature connection and climate change beliefs. Additional support comes from studies outside the NEP framework. For example, a qualitative study found that nature connection involves affective affinity with, empathy toward, and a sense of responsibility for nature (Furness, 2021). In agreement with this, Wang et al. (2019) showed that a mindfulness intervention increased nature connection, which subsequently strengthened climate change beliefs. Together, these findings provide theoretical justification for hypothesizing that climate change beliefs serve as a mediator between nature connection and climate policy support.

Furthermore, domicile should also be considered a predictor at the same conceptual level as adulthood and childhood nature exposure. Most studies examining the serial mediation of nature exposure, nature connection, and pro-environmental behaviors have focused on urban populations (Cleary et al., 2020), with limited attention to differences in domicile (e.g., Stehl et al., 2024). As urban dwellers are increasingly disconnected from nature and spend most of their time indoors (Frumkin et al., 2017), it is plausible that living in urban areas is associated with lower nature connection. Accordingly, rural (vs. urban) domicile may be linked to stronger climate policy support (i.e., the distal outcome in this study), potentially via higher nature connection and stronger climate change beliefs.

Lastly, it is also essential to account for covariates that may influence the relationships described above. Key covariates include age, gender, socio-economic status (e.g., income, education), and political orientation (conservative vs. liberal). Among these, younger individuals tend to subscribe to stronger climate change beliefs (Hornsey et al., 2016), although evidence on the link between age and climate policy support is mixed (Bumann, 2021; Dietz et al., 2007). Women, higher income, higher level of education, and those identifying as politically liberal are more likely to hold stronger climate change beliefs (Hornsey et al., 2016) and stronger climate policy support (Bumann, 2021; Dietz et al., 2007; Drews & Van Den Bergh, 2016; O'Connor et al., 2002; Sherman et al., 2016). These findings highlight the importance of controlling statistically for these variables when examining the indirect effects of nature-related predictors on climate policy support via nature connection and climate change beliefs.

2. Objectives

To address the research gaps outlined above, the present study employed a serial mediation model. From this point onward, we use the term *self-nature connection*—defined as the extent to which an individual believes that they are part of the natural environment (Martin & Czellar, 2016; Schultz, 2002)—to refer to one of the mediators in our study, thereby clarifying the meaning of “nature connection” given its various definitions in the literature. Specifically, we aimed to examine whether higher levels of adulthood and childhood nature exposure, as well as rural (vs. urban) domicile, predict climate policy support through self-nature connection and climate change beliefs, while controlling for relevant sociodemographic variables (Fig. 1). We chose to model the pathway from adulthood nature exposure to nature connection, rather than the reverse (i.e., from nature connectedness to recent visits to blue/green spaces in Stehl et al., 2024), in order to incorporate the findings of Cleary et al. (2020), who reported that both adulthood and childhood nature exposure predicted nature connection, into those of

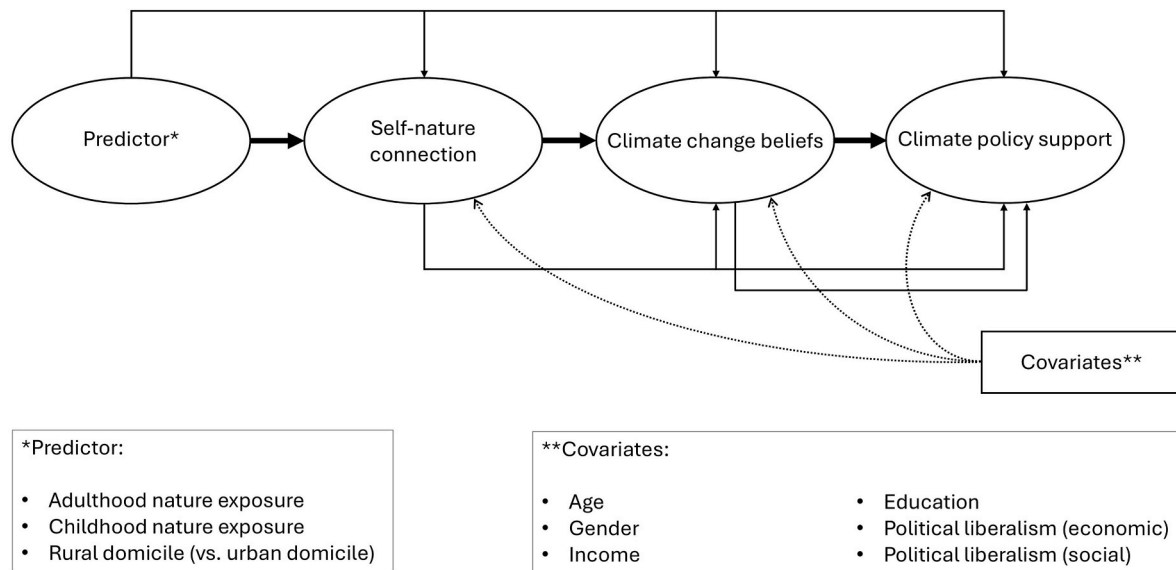


Fig. 1. Hypothesized relationships

Note. Heavy arrows represent indirect paths, which are the primary focus of this study, while light arrows correspond to direct paths. All the covariates were hypothesized to have direct effects on all endogenous variables, as indicated by the light curved arrows in the figure. Only one predictor is shown in the graph for readability, but the actual model includes all three predictors at once.

Martin et al. (2020), who found that nature connection moderated the relationship between nature exposure and pro-environmental behaviors.

Based on this framework, we posed the following research questions (RQs), controlling for age, gender, socio-economic status (income and education), and political liberalism regarding economic and social issues.

RQ1: Is the association between adulthood nature exposure and climate policy support mediated by self-nature connection and climate change beliefs?

RQ2: Is the association between childhood nature exposure and climate policy support mediated by self-nature connection and climate change beliefs?

RQ3: Is the association between rural (vs. urban) domicile and climate policy support mediated by self-nature connection and climate change beliefs?

RQ4: Is the association between self-nature connection and climate policy support mediated by climate change beliefs?

The hypotheses corresponding to these RQs are listed in Section 3.5, “Research hypotheses.”

It should be noted that, following reviewer feedback, we modified our analysis methods and hypotheses, which had originally been based on multiple linear regressions and preregistered at the OSF registry (Grassini et al., 2022). This modification aimed to reveal more nuanced relationships between predictors and outcome variables not revealed by multiple linear regressions.

3. Methods

This study is part of a larger research project reported in Vlasceanu et al. (2024), which explored strategies to motivate people to change their climate beliefs and behaviors. In this multi-country project, data was collected through a large-scale online survey from 63 countries ($N = 59,440$). We refer below to this main project survey as “the primary survey.” The authors of the current study were responsible for data collection in Finland. In agreement with the guidelines of the main project, we appended a short survey for the Finnish sample to the end of the primary survey and call it “the additional survey” in this article. Our

additional survey included measures for the nature-related predictors and mediator (adulthood nature exposure, childhood nature exposure, domicile, and self-nature connection), which were not part of the primary survey. All other measures were included in the primary survey.

Data collection was outsourced to a company specialized in survey data collection (MSI, <https://site.msi-aci.com/>) and the respondents were recruited from a population panel representative of age and gender. This study followed national and local regulations and was conducted in accordance with the Declaration of Helsinki regarding scientific research involving human participants. The protocol of this study was reviewed and approved by the ethics committee concerning University of Stavanger, to which the third (last) author of this paper belonged when this study was carried out (date of approval: October 24, 2022, reference number: 137709). All funding was provided by this university. The data-collection company anonymized the data before it was supplied to all the authors for analysis. As this study adhered to the principle of informed consent and entailed no intervention in the physical integrity of participants, no ethics review was required by Tampere University. The Supplementary Materials are stored in the OSF repository (https://osf.io/nkbpq/?view_only=11b653c9142440179ef2f66a79eed506).

3.1. Sample

3.1.1. A priori sample size estimation

The required number of subjects was determined for the original preregistered multiple linear regressions as opposed to the serial mediation analysis reported in this paper. It was calculated to be at least $N = 118$, in an *a priori* power calculation by G*Power 3.1 (Faul et al., 2007, 2009) with medium effect size $f^2 = .15$, alpha level .05, 80 % statistical power, and number of predictors 10 (including covariates). Our preregistered data collection plan determined the sample size to be $N = 140$, anticipating some dropouts and invalid responses.

3.1.2. Actual sample size

Data collection for our sample was, however, eventually extended beyond what was initially planned. This increase is primarily due to the survey design, over which we did not have full control. For Vlasceanu et al. (2024), which involved 59,440 participants from 63 countries, a large sample size of several hundred respondents from Finland was

needed. To accommodate this, we deliberately did not impose any arbitrary restrictions to limit the number of respondents who could proceed to our additional survey. More specifically, when respondents completed the main survey, a message appeared on the screen, explaining that a) an additional survey would start and b) participation was voluntary, allowing respondents to abandon the survey if they wished. This way, all participants who completed the main survey were given equal opportunity to participate in our additional survey. The process of excluding participants who had failed to select the correct answers in the attention checks (e.g., “Please select the color ‘purple’ from the list below”) was the same as in the original study (Vlasceanu et al., 2024).

Consequently, a total number of 652 respondents completed both the primary and additional surveys with valid responses. This sample contained missing values, leading the final N for the analysis to be 478 due to listwise deletion (for further details, please refer to Section 3.4, “Statistical analyses”). It is also worth noting that the number of respondents who completed the surveys in our sample ($N = 652$) was slightly larger than the Finnish sample size reported in Vlasceanu et al. (2024) ($N = 625$). This discrepancy occurred because a small number of additional responses were delivered by the data-collection company after the data-transfer deadline for Vlasceanu and colleagues’ study passed, and we included these responses in our analysis.

3.2. Measures

3.2.1. Predictors

3.2.1.1. Adulthood and childhood nature exposure. Adulthood nature exposure and childhood nature exposure were measured on the Nature Exposure Scale II (NES-II) and the Retrospective Nature Exposure Scale (RNES-II) (Wood et al., 2019). An advantage of these instruments is that they account for exposure to nature during physical activity (or green exercise), which was not included in earlier versions (e.g., the four-item prototype version of the NES) (Wood et al., 2019). The NES-II comprises five items assessing current levels of exposure to nature a) in one’s everyday life and activities, b) when making excursions outside one’s everyday environments, and c) one’s use of natural environments for physical activity (Wood et al., 2019). The five items were rated on a five-point bipolar scale: (1) “How much do you notice the natural environments in your everyday life?” (5 = a great deal, 1 = not much); (2) “Please rate the frequency (how often) of exposure to nature-rich environments outside your everyday environment” (5 = high, 1 = low); (3) “How much notice would you take of the nature in these environments?” (5 = a great deal, 1 = not much); (4) “Please rate the frequency (how often) in which you perform physical activity in nature-rich environments” (5 = high, 1 = low); (5) “How much notice would you take of [the] nature when you are performing physical activity?” (5 = a great deal, 1 = not much) (Wood et al., 2019). The RNES-II has a structure almost identical to the NES-II, except that each item statement ends with the phrase “during childhood.” The reliabilities of these five-item scales were satisfactory (Cronbach $\alpha = .81$ for the NES-II, $\alpha = .89$ for RNES-II).

It should be noted that Wood et al. initially designed the NES-II and RNES-II as six-item questionnaires, with the following item as Item 1: “In your everyday home, travel and work [schools’] environments and activities, please rate your level of exposure to natural environments [during childhood] (5 = high, 1 = low)” (Wood et al., 2019). However, they later found that removing this item improved model fit for both questionnaires and recommend using the five-item versions of these instruments (Wood et al., 2019). To accommodate their recommendation, we first collected data using the original six-item versions of the NES-II and RNES-II and then performed model fit comparisons for the serial mediation model to determine whether omitting this controversial item would indeed improve the definition of the latent variables: *adulthood nature exposure* and *childhood nature exposure*. Based on the

model fit comparison results, we decided to remove the item as an indicator of these latent variables (note: details of this process are provided later in Section 3.4.2, “Model fit comparisons”). Therefore, Items 1–5 of the five-item NES-II and RNES-II in our present study correspond to Items 2–6 of the original six-item versions reported in Wood et al. (2019).

3.2.1.2. Domicile (rural vs. urban). In addition, we also included our original question on domicile: “Are you living in a rural or urban environment?” (1 = very rural, 2 = moderately rural, 3 = moderately urban, 4 = very urban). This variable was recoded into a dichotomous categorical variable (0 = living in an urban area, 1 = living in a rural area), merging “very-” and “moderately-” options. Here, the recoded variable has the higher score for rural domicile.

3.2.2. Mediators

3.2.2.1. Self-nature connection. Self-nature connection was measured by the Extended Inclusion of Nature in Self Scale (EINS), a pictorial questionnaire aiming to assess the extent to which an individual believes that they are part of the natural environment (Martin & Czellar, 2016; Schultz, 2002). The EINS is an extended version of the Inclusion of Nature in Self Scale (INS) (Schultz, 2001, 2002). The EINS comprises four rows and seven columns such that the rows correspond to the items (overlap, size, distance, and central) indicating the categories of self-nature connection, while the columns represent a seven-point scale measuring the degree of connection. The items were, for instance, Q1: “Please choose the picture below which best describes your relationship with the natural environment.” The higher the score, the stronger the self-nature connection. The reliability of this four-item scale was satisfactory (Cronbach’s $\alpha = .87$).

3.2.2.2. Climate change beliefs. Climate change beliefs (i.e., the level of respondents’ beliefs in perceiving climate change as a problem caused by human activities) was measured using a sliding bar (0 = not at all accurate, 100 = extremely accurate) with the four statements shown in Table 1. As opposed to “yes-or-no” options, which in the literature were frequently used for pro-environmental behavior questionnaires (Alcock et al., 2020; Martin et al., 2020; Stehl et al., 2024), we employed sliding bars to realize more nuanced measures. The factor analysis results and the Cronbach’s α for this measure are reported later in Section 3.2.4, “Exploratory factor analysis.”

3.2.3. Outcome variable: climate policy support

As with climate change beliefs, climate policy support (the extent to which respondents supported climate policies) was also assessed using a sliding bar (0 = not at all, 100 = very much so) with the nine statements listed in Table 1. The factor analysis results and the Cronbach’s α for this measure are reported later in Section 3.2.4, “Exploratory factor analysis.”

3.2.4. Exploratory factor analysis

Although this was not included in our preregistered analysis plan, we performed an exploratory factor analysis (EFA), testing whether the two climate-related questionnaires (beliefs and policy support) really measured unique constructs. We applied the retaining/cutoff criteria for factor loadings proposed by Hinkin: An item will be retained if a primary loading is greater than .40 and/or a loading is twice as strong on the primary factor than on any other factor (Hinkin, 1998). As listed in Table 1, all four items on *beliefs* belonged to Factor 1, while the nine items on *climate policy support* were categorized to either Factor 2 or 3. Following Hinkin’s rule, Items 3 and 7 from the climate policy support scale were removed due to cross-loadings. We then labeled the two factors of climate policy support as follows: a) *resource-focused* support and b) *infrastructure-focused* support. After the removal of the

Table 1
Exploratory factor analysis results of the beliefs and policy support questionnaires.

Item	Factor		
	1	2	3
<i>Climate Change Beliefs:</i> How accurate do you think these statements are?			
BL1	Taking action to fight climate change is necessary to avoid a global catastrophe.	.752	
BL2	Human activities are causing climate change.	.970	
BL3	Climate change poses a serious threat to humanity.	.799	
BL4	Climate change is a global emergency.	.954	
<i>Climate Policy Support:</i> Please indicate your level of agreement with the following statements.			
PS1	I support significantly expanding infrastructure for public transportation.		.754
PS2	I support protecting forested and land areas.	.597	
PS3	I support increasing the number of charging stations for electric vehicles.	.328	.393
PS4	I support investing more in green jobs and businesses.	.666	
PS5	I support increasing taxes on airline companies to offset carbon emissions.		.488
PS6	I support increasing taxes on carbon intense foods (for example meat, and dairy).	.617	
PS7	I support raising carbon taxes on gas/fossil fuels/coal.	.401	.382
PS8	I support increasing the use of sustainable energy such as wind and solar energy.	.791	
PS9	I support introducing laws to keep waterways and oceans clean.		.919

Note. BL: beliefs, PS: policy support. PS3 and PS7 were removed from the analysis due to cross-loadings. These questions were included in the survey composed by Vlasceanu and colleagues (Doell et al., 2024; Vlasceanu et al., 2024).

cross-loaded items, the reliabilities of all three questionnaires were satisfactory: respective Cronbach’s α s = .95, .81, and .82 for climate change beliefs, resource-focused support, and infrastructure-focused support.

3.2.5. Covariates

3.2.5.1. Age. Respondents’ age was regarded as a continuous variable in our analysis. Among the original 652 respondents, one person reported her age as “.65,” probably because of mistyping. We regarded it as a missing value.

3.2.5.2. Gender. Regarding gender, the respondents were asked to choose one of four options: 1 = male, 2 = female, 3 = prefer not to say, 4 = non-binary/third gender/other. However, in the analysis, we included only the binary options (i.e., male or female) as only three participants from the initial sample of $N = 652$ chose the third and fourth options ($n = 1$ for “prefer not to say,” $n = 2$ for “non-binary/third gender/other”).

3.2.5.3. Income. Respondents’ total yearly family/household income was assessed with a nine-option question: 1 = less than \$10,000, 2 = \$10,000 to \$14,999, 3 = \$15,000 to \$24,999, 4 = \$25,000 to 49,999, 5 = \$50,000 to \$99,999, 6 = \$100,000 to \$149,999, 7 = \$150,000 to \$199,999, 8 = \$200,000 or more, 9 = prefer not to respond. Responses selecting “9” were excluded from the analysis and the variable was treated as ordinal.

3.2.5.4. Education. Respondents’ education level (i.e., years of formal education completed) was evaluated with a five-option question: 1 = 0–6 years (up to grade school/elementary school), 2 = 7–12 years (up to high school), 3 = 13–16 years (college/undergraduate university/certificate training), 4 = more than 17 years (doctorate degree, medical

degree, etc.), 5 = prefer not to answer. Responses selecting “5” were excluded from the analysis and the variable was treated as ordinal.

3.2.5.5. Political liberalism on economic and social issues. Respondents’ political orientation was measured with two items, starting with a common question, “What is your political orientation for the issues listed below? Please note, by ‘liberal’ we mean classically left-wing, and by ‘conservative’, we mean classically right-wing”: (1) For economic issues (e.g., taxes); (2) For social issues (e.g., health care, education, etc.) (Vlasceanu et al., 2024). These two aspects were assessed using a sliding bar (0 = extremely liberal/left-wing, 100 = extremely conservative/right wing, or “prefer not to respond”). In the analysis, we reversed the scores so that liberal respondents had higher scores and below we will call these variables “political liberalism on economic/social issues.” These reversed variables were included as covariates.

3.3. Survey protocol

All respondents participated in the primary survey, followed by the additional survey. The primary survey started with the informed consent section, which began with the introductory sentence, “You have been invited to take part in a research study to learn more about your beliefs and behaviors.” Climate change beliefs, climate policy support, age, gender, income, education, and political liberalism on economic and social issues were measured in the primary survey, whose protocol is described in Vlasceanu et al. (2024). When finishing the primary survey, respondents were debriefed and received a thank-you message. At this time, the respondents could close the window and leave the survey without moving on to the additional survey.

The additional survey targeted the Finnish respondents only. It started with the introductory sentence: “In this section, we would like to assess the level of your connectedness to nature.” The respondents completed the NES-II, RNES-II, and EINS questionnaires in this order, followed by the questionnaire on domicile (rural vs. urban).

3.4. Statistical analyses

3.4.1. Analytic model

A structural equation modeling (SEM) was conducted based on reviewer feedback to provide a comprehensive analysis, including latent variables and indirect effects. The sample size for the SEM analysis was $N = 478$ due to listwise deletion. We used the *SEMLj* module in Jamovi (Version 2.6), which is based on the *lavaan* package in R, to test the mediation model (Gallucci & Jentschke, 2021; R Core Team, 2024; Rosseel, 2012; The Jamovi Project, 2024). The model was estimated using maximum likelihood. Adulthood nature exposure, childhood nature exposure, self-nature connection, climate change beliefs, resource-focused support, and infrastructure-focused support were formed as latent variables with multiple observed indicators, while domicile was an observed dichotomous variable (0 = urban, 1 = rural). All the covariates were observed variables. Specifically, age and political liberalism on economic/social issues were continuous variables; income and education were ordinal variables; and gender (0 = male, 1 = female) was a dichotomous variable. All the covariates were hypothesized to have direct effects on all the endogenous variables (self-nature connection, climate change beliefs, and resource- and infrastructure-focused support).

3.4.2. Model fit comparisons

We performed two types of model fit comparisons for the SEM. First, we examined whether our decision to use the five-item versions (as opposed to the six-item versions) of the NES-II and RNES-II questionnaires was justifiable. We compared two models: Model 1 (the current model, in which the latent variables “adulthood nature exposure” and “childhood nature exposure” were defined by the five-item versions) vs.

Model 2 (based on the six-item versions). The results showed that the overall fit of Model 1 was $\chi^2(411) = 960, p < .001, \chi^2/df = 2.34, RMSEA = .053, CFI = .928$, while the fit of Model 2 was $\chi^2(474) = 1368, p < .001, \chi^2/df = 2.89, RMSEA = .063, CFI = .892$, suggesting the superiority of Model 1. Therefore, our decision to use the five-item versions was justified.

The second type of comparison focused on the inclusion of the covariates. In the current model (Model 1), adulthood nature exposure, childhood nature exposure, and domicile were exogenous variables; all the covariates were only predictors of self-nature connection, climate change beliefs, and resource- and infrastructure-focused support. We compared this model with a more complex model (Model 3), in which the three exogenous variables were redefined as endogenous variables predicted by all the covariates. The model fit comparison revealed that Model 1 showed a fit of $\chi^2(411) = 960, p < .001, \chi^2/df = 2.34, RMSEA = .053, CFI = .928$, while Model 3 showed a fit of $\chi^2(397) = 1185, p < .001, \chi^2/df = 2.98, RMSEA = .064, CFI = .897$, suggesting that Model 1 provided a better fit. Based on these results, we decided to continue using Model 1, the most parsimonious model. All findings reported in the Results section are derived from this model.

3.4.3. Sensitivity analysis

To confirm the robustness of the SEM analysis, we inspected the standard errors and 95 % confidence intervals of the estimates using percentile-based bootstrapping (5000 resamples), following the recommendation of Hayes and Scharkow (2013).

3.5. Research hypotheses

We tested four research hypotheses (H1-H4). The first three addressed the predictors, proposing that the paths from adulthood nature exposure (H1), childhood nature exposure (H2), and rural (vs. urban) domicile (H3) to climate policy support are mediated by self-nature connection and climate change beliefs. The fourth hypothesis (H4) proposed that the path from self-nature connection to climate policy support is mediated by climate change beliefs. Each hypothesis includes two sub-components: (a) resource-focused and (b) infrastructure-focused climate policy support.

4. Results

4.1. Descriptive statistics

Table 2 shows the descriptive statistics of the continuous variables, Table 3 lists the frequencies of the categorical and ordinal variables, and Table 4 presents the Spearman’s correlation coefficients of all the variables. Note that the scores for adulthood and childhood nature exposure, self-nature connection, climate change beliefs, and resource- and infrastructure-focused climate policy support reported in Tables 2 and 4 are observed means of the corresponding questionnaire items as opposed to factor scores derived from latent variable estimation. The

Table 2
Descriptive statistics of the continuous variables after listwise deletion.

Continuous variable (observed mean)	<i>M</i>	<i>Mdn</i>	<i>SD</i>	Skewness
Climate policy support (resource)	75.12	79.13	20.03	-1.06
Climate policy support (infrastructure)	51.74	52.50	25.97	-0.19
Climate change beliefs	76.52	82.63	23.76	-1.19
Self-nature connection (EINS)	4.79	5.00	1.19	-0.22
Adulthood nature exposure (NES-II)	4.01	4.00	0.73	-0.56
Childhood nature exposure (RNES-II)	4.16	4.40	0.80	-0.89
Age	40.92	38.00	14.29	0.42
Political liberalism (economic)	50.68	49.00	25.19	0.02
Political liberalism (social)	47.05	48.00	23.67	0.16

Note. *N* = 478. *M* = mean, *Mdn* = median, *SD* = standard deviation, Skewness = standardized skewness.

Table 3
Frequencies of the categorical and ordinal variables after listwise deletion.

Variable	Counts	% of Total
Domicile		
0 (urban)	287	60.0
1 (rural)	191	40.0
Gender		
0 (male)	211	44.1
1 (female)	267	55.9
Income		
1 (less than \$10,000)	18	3.8
2 (\$10,000 to \$14,999)	34	7.1
3 (\$15,000 to \$24,999)	46	9.6
4 (\$25,000 to \$49,999)	156	32.6
5 (\$50,000 to \$99,999)	171	35.8
6 (\$100,000 to \$149,999)	38	7.9
7 (\$150,000 to \$199,999)	7	1.5
8 (\$200,000 or more)	8	1.7
Education		
1 (0-6 years, up to grade school/elementary school)	19	4.0
2 (7-12 years, up to high school)	131	27.4
3 (13-16 years, college/undergraduate university/certificate training)	255	53.3
4 (more than 17 years, doctoral degree, medical degree, etc.)	73	15.3

Note. *N* = 478 (after listwise deletion).

sample size for all these tables is *N* = 478 (after listwise deletion). Age ranged from 18 to 73 years (*M* = 40.9, *SD* = 14.3), females accounting for 55.9 % of the sample. The sample had a higher proportion of urban residents than of rural residents, although the distribution is relatively balanced (Table 3). Regarding zero-order (Spearman’s) correlations, the observed mean scores of resource- and infrastructure-focused support, climate change beliefs, self-nature connection (EINS), adulthood nature exposure (NES-II), and childhood nature exposure (RNES-II) were positively correlated to each other, except for the relationship between childhood nature exposure and infrastructure-focused support (Table 4). Rural domicile was negatively correlated to infrastructure-focused support but positively correlated to adulthood nature exposure, childhood nature exposure, and self-nature connection.

4.2. The mediation model

4.2.1. Sensitivity analysis using bootstrapping

A sensitivity analysis for Model 1 indicated that percentile-based bootstrapping (5000 resamples) yielded slightly more conservative results. Notably, two direct effects—those of adulthood and childhood nature exposure on infrastructure-focused support—were statistically significant in the original (non-bootstrapped) model but became non-significant under bootstrapping. All other direct and indirect paths retained their original significance status. Unless otherwise stated, the following results reflect the original (non-bootstrapped) standard errors (SEs) and 95 % confidence intervals (CIs). Bootstrapped standard errors and confidence intervals are reported in the Supplementary Material.

4.2.2. Overall model fitting

The direct and indirect effects of Model 1 are detailed in Tables 5 and 6 respectively, and the significant paths of the SEM analysis are illustrated in Fig. 2. The model explained 47 % of the variance in self-nature connection, 15 % of the variance in climate change beliefs, 67 % of the variance in resource-focused climate policy support, and 46 % of the variance in infrastructure-focused climate policy support (Fig. 2). This indicates that the predictors in the model collectively accounted for

Table 4
Spearman's correlation coefficients.

Measure	1	2	3	4	5	6	7	8	9	10	11	12
1. Climate policy support (resource)	–											
2. Climate policy support (infrastructure)	.507***	–										
3. Climate change beliefs	.706***	.530***	–									
4. EINS	.310***	.145**	.243***	–								
5. NES-II	.357***	.154***	.266***	.586***	–							
6. RNES-II	.295***	.060	.218***	.457***	.702***	–						
7. Domicile (0 = urban, 1 = rural)	–.059	–.142**	–.074	.108*	.178***	.131**	–					
8. Age	.058	.008	.057	.180***	.184***	.195***	.052	–				
9. Gender (0 = male, 1 = female)	.177***	–.047	.174***	.181***	.166***	.201***	.106*	–.021	–			
10. Income	–.055	–.084	–.100*	.100*	.094*	.027	.081	.028	–.046	–		
11. Education	.035	.150**	.060	.085	.067	.050	–.009	–.010	.051	.279***	–	
12. Political liberalism (economic)	.204***	.116*	.183***	–.049	–.074	.046	–.133**	–.015	.131**	–.130**	–.099*	–
13. Political liberalism (social)	.102*	.061	.131**	–.103*	–.065	.025	–.121**	–.023	.210***	–.125**	–.174***	.664***

Note. $N = 478$ (after listwise deletion). * $p < .05$, ** $p < .01$, *** $p < .001$. NES-II: adulthood nature exposure; RNES-II: childhood nature exposure; EINS: self-nature connection. Domicile and gender are categorical variables, income and education are ordinal variables, and the others are continuous variables.

Table 5
Significant direct effects of the SEM.

Path No.	Predictor variable	Outcome variable	B	SE	β	β 95 % CIs		p
						Lower	Upper	
Main predictor								
1	Adulthood nature exposure	Self-nature connection	1.651	0.248	.751	.583	.918	<.001
2		Beliefs	14.820	5.381	.348	.109	.586	.006
3		Resource-focused support	10.574	3.854	.277	.086	.469	.006
4 ^a		Infrastructure-focused support	12.917	6.360	.233	.012	.454	.042
5	Childhood nature exposure	Self-nature connection	–0.168	0.136	–.110	–.284	.065	.219
6		Beliefs	–3.262	2.865	–.110	–.299	.079	.255
7		Resource-focused support	–1.185	2.006	–.045	–.193	.104	.555
8 ^a		Infrastructure-focused support	–7.857	3.388	–.204	–.375	–.033	.020
9	Rural domicile	Self-nature connection	–0.017	0.089	–.008	–.089	.072	.845
10		Beliefs	–4.465	1.883	–.106	–.193	–.019	.018
11		Resource-focused support	–1.398	1.321	–.037	–.106	.032	.290
12		Infrastructure-focused support	–5.824	2.223	–.106	–.185	–.027	.009
13	Self-nature connection	Beliefs	1.542	1.439	.080	–.066	.225	.284
14		Resource-focused support	0.193	1.000	.011	–.102	.124	.847
15		Infrastructure-focused support	0.140	1.679	.006	–.125	.136	.934
16	Beliefs	Resource-focused support	0.611	0.047	.683	.620	.746	<.001
17		Infrastructure-focused support	0.756	0.065	.580	.503	.657	<.001
Covariate (significant effects only)								
18	Age	Self-nature connection	0.006	0.003	.082	.004	.159	.039
19	Gender (female)	Self-nature connection	0.245	0.088	.114	.035	.194	.005
20		Beliefs	4.189	1.909	.101	.011	.191	.028
21		Infrastructure-focused support	–8.843	2.258	–.164	–.245	–.082	<.001
22	Income	Beliefs	–1.557	0.729	–.099	–.189	–.009	.033
23	Education	Infrastructure-focused support	5.789	1.526	.159	.078	.241	<.001
24	Political liberalism (economic)	Resource-focused support	0.113	0.035	.155	.062	.247	.001
25	Political liberalism (social)	Self-nature connection	–0.006	0.003	–.142	–.250	–.034	.011

Note. $N = 478$ (after listwise deletion). B = unstandardized coefficients, SE = standard error of B , β = standardized coefficients, CI = confidence interval. Beliefs: climate change beliefs.

^a Paths 4 and 8 became non-significant after bootstrapping. In the main predictor section, both significant and non-significant effects are shown (bold face indicates significant). In the covariate section, only significant effects are shown for readability.

substantial proportions of variance in key outcomes, particularly in resource- and infrastructure-focused support. In the following paragraphs, direct and indirect effects are reported with regard to each of the main predictors. It should be noted that the terms “direct/indirect effects” in the context of discussing the paths in the SEM do not refer to causal effects; they are used here solely in accordance with standard practice for reporting SEM results (e.g., Stehl et al., 2024).

4.2.3. Covariances between the three predictors

Significant positive covariances were found among the three exogenous variables: between adulthood and childhood nature exposure, $\beta = .80$, $CI_{95} \% [.75, .84]$; between adulthood nature exposure and rural

domicile, $\beta = .15$, $CI_{95} \% [.06, .25]$; and between childhood nature exposure and rural domicile, $\beta = .12$, $CI_{95} \% [.02, .21]$ (shown by the double-headed arrows on the left in Fig. 2).

4.2.4. Direct/indirect effects of adulthood nature exposure

Adulthood nature exposure had significant positive direct effects on self-nature connection, $\beta = .75$, $CI_{95} \% [.58, .92]$; on climate change beliefs, $\beta = .35$, $CI_{95} \% [.11, .59]$; on resource-focused support, $\beta = .28$, $CI_{95} \% [.09, .47]$; and on infrastructure-focused support, $\beta = .23$, $CI_{95} \% [.01, .45]$ (Table 5, Fig. 2). However, as noted in the sensitivity analysis results, the direct effect on infrastructure-focused support became non-significant under bootstrapping, $CI_{95} \%, \text{bootstrapped} [–.02, .49]$ (see the

Table 6
Significant indirect effects of the SEM.

Path No.	Indirect effect	B	SE	β	β 95 % CIs		p
					Lower	Upper	
Main predictor							
1	Adulthood nature exposure \Rightarrow Self-nature connection \Rightarrow Beliefs \Rightarrow Resource-focused support	1.555	1.454	.041	-.034	.115	.285
2	Adulthood nature exposure \Rightarrow Self-nature connection \Rightarrow Beliefs \Rightarrow Infrastructure-focused support	1.923	1.800	.035	-.029	.098	.285
3	Adulthood nature exposure \Rightarrow Self-nature connection \Rightarrow Resource-focused support	0.319	1.647	.008	-.076	.093	.846
4	Adulthood nature exposure \Rightarrow Self-nature connection \Rightarrow Infrastructure-focused support	0.231	2.769	.004	-.094	.102	.934
5	Adulthood nature exposure \Rightarrow Beliefs \Rightarrow Resource-focused support	9.054	3.288	.238	.077	.399	.006
6	Adulthood nature exposure \Rightarrow Beliefs \Rightarrow Infrastructure-focused support	11.196	4.072	.202	.064	.340	.006
7	Childhood nature exposure \Rightarrow Self-nature connection \Rightarrow Beliefs \Rightarrow Resource-focused support	-0.158	0.185	-.006	-.020	.008	.395
8	Childhood nature exposure \Rightarrow Self-nature connection \Rightarrow Beliefs \Rightarrow Infrastructure-focused support	-0.195	0.230	-.005	-.017	.007	.395
9	Childhood nature exposure \Rightarrow Self-nature connection \Rightarrow Resource-focused support	-0.032	0.167	-.001	-.014	.011	.846
10	Childhood nature exposure \Rightarrow Self-nature connection \Rightarrow Infrastructure-focused support	-0.023	0.280	-.001	-.015	.014	.933
11	Childhood nature exposure \Rightarrow Beliefs \Rightarrow Resource-focused support	-1.993	1.745	-.075	-.204	.053	.253
12	Childhood nature exposure \Rightarrow Beliefs \Rightarrow Infrastructure-focused support	-2.465	2.155	-.064	-.173	.045	.253
13	Rural domicile \Rightarrow Self-nature connection \Rightarrow Beliefs \Rightarrow Resource-focused support	-0.016	0.085	.000	-.005	.004	.847
14	Rural domicile \Rightarrow Self-nature connection \Rightarrow Beliefs \Rightarrow Infrastructure-focused support	-0.020	0.105	.000	-.004	.003	.847
15	Rural domicile \Rightarrow Self-nature connection \Rightarrow Resource-focused support	-0.003	0.024	.000	-.001	.001	.890
16	Rural domicile \Rightarrow Self-nature connection \Rightarrow Infrastructure-focused support	-0.002	0.032	.000	-.001	.001	.939
17	Rural domicile \Rightarrow Beliefs \Rightarrow Resource-focused support	-2.728	1.162	-.072	-.132	-.013	.019
18	Rural domicile \Rightarrow Beliefs \Rightarrow Infrastructure-focused support	-3.373	1.443	-.062	-.113	-.011	.019
19	Self-nature connection \Rightarrow Beliefs \Rightarrow Resource-focused support	0.942	0.885	.054	-.045	.154	.287
20	Self-nature connection \Rightarrow Beliefs \Rightarrow Infrastructure-focused support	1.165	1.095	.046	-.039	.131	.288
Covariate							
21	Gender \Rightarrow Beliefs \Rightarrow Resource-focused support	2.559	1.177	.069	.008	.130	.030
22	Gender \Rightarrow Beliefs \Rightarrow Infrastructure-focused support	3.165	1.460	.059	.005	.112	.030
23	Income \Rightarrow Beliefs \Rightarrow Resource-focused support	-0.951	0.450	-.068	-.130	-.005	.035
24	Income \Rightarrow Beliefs \Rightarrow Infrastructure-focused support	-1.176	0.559	-.057	-.110	-.004	.035

Note. $N = 478$ (after listwise deletion). $B =$ unstandardized coefficients, $SE =$ standard error of B , $\beta =$ standardized coefficients, $CI =$ confidence interval. Beliefs: climate change beliefs. In the main predictor section, both significant and non-significant effects are shown (bold face indicates significant). In the covariate section, only significant effects are shown for readability.

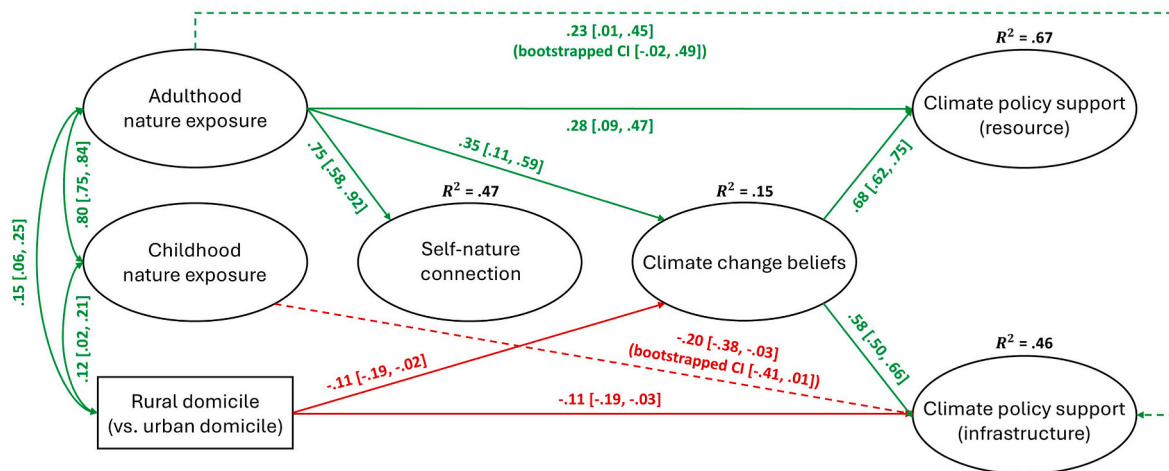


Fig. 2. The significant direct paths (95 % CIs do not cross zero) of the Model ($N = 478$; see the Supplementary Materials for all path estimates and their 95 % CIs) Note. Latent variables are given in ellipses and the observed variable in a rectangle. The double-headed arrows between the exogenous variables refer to covariances. Dashed arrows indicate the direct effects that became non-significant under bootstrapping. For readability, the observed variables reflecting the latent variables (e.g., the observed scores for the five items of the NES-II questionnaire that reflect the latent variable *adulthood nature exposure*) are not shown. For more details, please see the Supplementary Materials.

dashed green arrow in Fig. 2). This exogenous variable also had significant positive indirect effects on resource-focused support through climate change beliefs, $\beta = .24$, $CI_{95\%} [.08, .40]$; and on infrastructure-focused support through climate change beliefs, $\beta = .20$, $CI_{95\%} [.06, .34]$ (Table 6).

These results suggest that, remarkably, the direct effect on self-nature connection was the most marked, while the direct effect on infrastructure-focused support was the weakest and not robust. Regarding the roles of the mediators, climate change beliefs partially

mediated the path from adulthood nature exposure to resource-focused support and fully mediated the path to infrastructure-focused support. In contrast, self-nature connection did not mediate any of the relationships between adulthood nature exposure and the other endogenous variables. Thus, H1a and H1b were partially supported.

4.2.5. Direct/indirect effects of childhood nature exposure

Among the effects of childhood nature exposure on climate policy support, only the direct effect on infrastructure-focused support was

significant and negative, $\beta = -.20$, $CI_{95\%} [-.38, -.03]$ (Table 5, Fig. 2). However, as noted in the sensitivity analysis results, this direct effect became non-significant under bootstrapping, $CI_{95\%}$, bootstrapped $[-.41, .01]$ (see the dashed red arrow in Fig. 2). All the other direct and indirect effects were not significant. The absence of a robust direct effect, combined with non-significant indirect effects, suggests that childhood nature exposure may not have a meaningful association with climate policy support (either in resource or infrastructure categories) within the current model. Thus, H2a and H2b were not supported as no significant association was observed.

4.2.6. Direct/indirect effects of domicile

Rural domicile had significant negative direct effects on climate change beliefs, $\beta = -.11$, $CI_{95\%} [-.19, -.02]$; and on infrastructure-focused support, $\beta = -.11$, $CI_{95\%} [-.19, -.03]$ (Table 5, Fig. 2). This exogenous variable also had significant negative indirect effects on resource-focused support through climate change beliefs, $\beta = -.07$, $CI_{95\%} [-.13, -.01]$; and on infrastructure-focused support through climate change beliefs, $\beta = -.06$, $CI_{95\%} [-.11, -.01]$ (Table 6). This suggests that climate change beliefs fully mediated the negative relationship between rural domicile and resource-focused support, while it partially mediated the negative relationship between rural domicile and infrastructure-focused support. Self-nature connection did not act as a mediator. Thus, H3a and H3b were not supported as both associations were contrary to what was hypothesized.

4.2.7. Direct/indirect effects of self-nature connection

Contrary to our expectations, self-nature connection had no significant direct or indirect effect on climate change beliefs or on resource- or infrastructure-focused support. Additionally, this latent variable did not mediate any of the relationships between the three exogenous variables and the other endogenous variables. Thus, H4a and H4b were not supported.

4.2.8. Direct effects of climate change beliefs

Climate change beliefs, previously identified as a significant mediator, also had significant direct effects on both resource-focused support, $\beta = .68$, $CI_{95\%} [.62, .75]$; and infrastructure-focused support, $\beta = .58$, $CI_{95\%} [.50, .66]$ (Table 5, Fig. 2). These relatively large standardized coefficients, compared to those of the direct effects of the exogenous variables, indicate stronger relationships between climate change beliefs and climate policy support in both domains. Moreover, the stronger association with resource-focused support (vs. infrastructure-focused support) suggests that climate change beliefs play a slightly greater role in predicting support for resource-focused policies than for infrastructure-focused policies.

4.2.9. Effects of covariates

Results and discussion of the direct and indirect effects of covariates are reported in the Supplementary Materials.

5. Discussion

Using a serial mediation model with a sample of 478 respondents, the present study tested whether higher adulthood and childhood nature exposure, and rural (vs. urban) domicile predict climate policy support—in both resource- and infrastructure-focused domains—via stronger self-nature connection and climate change beliefs, while controlling for sociodemographic variables. Our SEM analysis first showed a significant positive covariance between adulthood and childhood nature exposure, consistent with Cleary et al. (2020). Although the effect sizes were modest, rural (vs. urban) domicile was also positively associated with both adulthood and childhood nature exposure, supporting the premise of greater nature exposure in rural (vs. urban) areas. The key findings are discussed in relation to each predictor in the sections that follow.

5.1. Paths from adulthood nature exposure via climate change beliefs

Adulthood nature exposure directly predicted higher levels of self-nature connection, climate change beliefs, and resource-focused climate policy support, while its link to infrastructure-focused support was not robust under bootstrapping. Climate change beliefs partially mediated the relationship between adulthood nature exposure and resource-focused support, and fully mediated its relationship with infrastructure-focused support. These mediating roles of climate change beliefs are consistent with the Value-Belief-Norm (VBN) theory, which posits that environmental beliefs shape, through personal norms, pro-environmental attitudes and behaviors (Stern et al., 1999), although our study did not directly assess personal norms. These results extend the findings reported so far in the literature (Bergquist et al., 2022; Drews & Van Den Bergh, 2016; Hornsey et al., 2016)—which showed that climate change beliefs were associated with climate policy support—by demonstrating that such beliefs may themselves be associated with adulthood nature exposure. These results corroborate existing literature linking adulthood nature exposure to pro-environmental attitudes or behaviors (Alcock et al., 2020; DeVille et al., 2021; Martin et al., 2020; Stehl et al., 2024). Notably, our findings extend the implications of Martin et al. (2020) and Stehl et al. (2024) by demonstrating that adulthood nature exposure predicted climate policy support (albeit as a pro-environmental *attitude*, not a *behavior*), not only directly but also through climate change beliefs.

Additionally, our model also yielded an unexpected result that adulthood nature exposure predicted support for resource-focused climate policies more strongly than support for infrastructure-focused policies. This pattern was shown for the paths both directly and indirectly through climate change beliefs. While this contrast was not hypothesized, it can be interpreted through the lens of VBN theory (Stern et al., 1999). As a premise, the resource-focused policies in our study (e.g., food choices, use of sustainable energy) may be perceived as more actionable or within the respondent's personal behavioral sphere, whereas the infrastructure-focused policies (e.g., expanding public transportation infrastructure) may seem more abstract and institutionally driven. Building on this premise, VBN theory could explain the stronger association with resource-focused support via constructs such as personal norms or the perceived efficacy of an individual's taking particular actions (Stern et al., 1999), although these constructs were not directly measured in our study. This unexpected finding highlights the need to account for the perceived personal relevance of policy domains in understanding how adulthood nature exposure and climate change beliefs relate to climate policy support.

In addition, this potential individual-versus-institutional distinction may have also been shaped by Finland's unique cultural backdrop, which could help explain why our exploratory factor analysis loaded the item "I support protecting forested and land areas" onto the resource-focused factor, while the item "I support introducing laws to keep waterways and oceans clean" loaded onto the infrastructure-focused factor. In this country, it is relatively common to own a home garden (Evers et al., 2000), and a lakeside summer cottage or a second home in a rural, often forested setting (Pitkänen, 2008; Vepsäläinen & Pitkänen, 2010). Thus, the Finnish respondents in our study may have unconsciously perceived "forested and land areas" (possibly including lakes as part of the setting of lakeside cottages) as being within the scope of their individual management or stewardship. In contrast, the respondents may have unconsciously associated the term "waterways and oceans" with transportation infrastructure, given their reliance on sea transport across the Gulf of Finland and the Baltic Sea (Urbanyi-Popiołek, 2019). Yet this interpretation remains speculative due to the absence of measures explicitly eliciting such semantic associations in our study. Future research should investigate how such terms are cognitively processed or understood by Finnish participants.

5.2. Paths from childhood nature exposure via climate change beliefs

Contrary to our expectations, however, childhood nature exposure did not predict self-nature connection in our model. This finding partially contrasts with Cleary et al. (2020), who found that both childhood and current nature experiences were associated with higher levels of nature connection. One possible explanation for our null finding is the cultural context of Finland, where nature and outdoor activities are deeply embedded in national identity (Hakoköngäs & Puhakka, 2023). Many Finns, for instance, spend time in natural settings such as lakeside cottages (Häkkinen et al., 2022; Hakoköngäs & Puhakka, 2023). Given this cultural setting, Finnish participants may have retrospectively overestimated their childhood nature exposure levels, resulting in a ceiling effect. This reduced variance in childhood nature exposure scores may have weakened its predictive power for self-nature connection, as well as for downstream variables such as climate change beliefs and climate policy support in both resource- and infrastructure-focused domains. While this interpretation remains speculative, it highlights the importance of cross-cultural comparisons. For example, Cleary et al.'s (2020) study was conducted in Brisbane, Australia, where childhood access to nature may differ considerably from that in Finland. Further research is needed to assess how cultural norms and living environments shape retrospective reports of nature exposure and their associated psychological factors, especially given the existing literature (mostly from the United States) suggesting that childhood nature exposure and the values formed through such experiences may lead to greater pro-environmental beliefs, attitudes, and behaviors later in life (Evans et al., 2018; Ewert et al., 2005).

Our null results regarding childhood nature exposure as a predictor and nature connection as a mediator are also somewhat at odds with the findings of Stehl et al. (2024), who reported significant positive relationships between recalled childhood blue space exposure and nature connection, as well as between nature connection and pro-environmental behavior. This discrepancy may be attributed to differences in the conceptual models and measurement approaches used in the two studies. First, Stehl et al. (2024) conceptualized their model such that recalled childhood blue space exposure predicted nature connection, which in turn predicted recent visits to blue/green spaces, ultimately leading to pro-environmental behavior. Conversely, we modeled both adulthood and childhood nature exposure as predictors of nature connection. Second, the measurement approaches diverged: Stehl et al. (2024) assessed respondents' recalled childhood blue space exposure using a three-item questionnaire, which included (1) access to nearby blue spaces, (2) perceived parental or guardian comfort with their playing in and around blue spaces, and (3) the frequency of visits to blue spaces. In contrast, our five-item questionnaire (RNES-II) focused on the extent of awareness of natural environments in one's everyday life, the degree of nature exposure outside one's daily environment, and the frequency of performing physical activity in nature-rich environments (Wood et al., 2019). These conceptual and methodological differences may have contributed to the partially contradictory results between our study and those reported by Stehl et al. (2024).

5.3. Paths from domicile via climate change beliefs

Contrary to our expectations, domicile did not predict self-nature connection. This result contradicts the literature reporting city dwellers' disconnection from nature (Frumkin et al., 2017). This discrepancy may be primarily due to cultural and geographical difference between urban areas in Finland and the US. Frumkin et al.'s argument builds on studies and demographic data primarily based on the US, where an estimated four out of five people live in urban areas and individuals spend more than 90 % of their time indoors (Frumkin et al., 2017). In Finland, however, a study reported that two-thirds of residents in Helsinki (i.e., the capital city with the country's highest population density) lived within 100 m of their recent close-to-home

natural recreation sites and made recreational visits to nature approximately once per 2–3 days (Neuvonen et al., 2007). This suggests that our Finnish respondents living in urban areas may not have been so disconnected from nature as those living in rural areas, which may have resulted in rural (vs. urban) domicile not serving as a significant predictor of self-nature connection in our study.

Despite the non-significant mediation of self-nature connection, rural (vs. urban) domicile showed a significantly negative direct association with infrastructure-focused support (but not with resource-focused support), even after controlling for age, gender, income, education, and political liberalism regarding economic and social issues. This negative association can be partly attributable to rural residents' reliance on cars compared to city dwellers' use of public transportation. Additionally, the direct pathway from rural domicile to climate change beliefs and the indirect pathways from rural domicile via climate change beliefs to resource- and infrastructure-focused support were significantly negative. These relationships can be partly explained by the prominence of farming as a main occupation in rural areas. Sorvali et al. (2021) found that, while almost all Finnish farmers agreed that climate change is occurring, approximately two-thirds attributed it to natural processes or to a combination of natural and human causes rather than to primarily human activities. Furthermore, Finnish farmers tend to view climate change as less of a threat to agriculture in Finland than to agriculture globally, and some even see it as offering new opportunities for Finnish agriculture as this country is located in the boreal zone (Sorvali et al., 2021). These factors may help explain why in our study rural domicile was associated with weaker beliefs in human-caused climate change and its associated threats.

5.4. Self-nature connection

Contrary to our expectations, self-nature connection did not predict any of the outcome variables. This result challenges former findings that nature connection predicts environmental policy support (Gkargkavouzi et al., 2019) and moderates the relationships between nature exposure and pro-environmental behaviors (Davis et al., 2009; Martin et al., 2020; Stehl et al., 2024; Whitburn et al., 2020). More specifically, our results suggest that self-nature connection *per se* may not be a relevant factor in predicting these outcome variables; rather, prediction may be better explained by adulthood nature exposure, which showed a positive zero-order correlation with self-nature connection. This interpretation would align with Alcock et al.'s (2020) findings that nature exposure is related to greater pro-environmental behaviors.

Our hypothesized pathway, which was theoretically justified by the intermediary role of the endorsement of NEP (i.e., a pro-environmental worldview), was contradicted by the non-significant link between self-nature connection and climate change beliefs. Earlier studies have separately linked nature connection to NEP endorsement (Martin & Czellar, 2016; Mayer & Frantz, 2004) and NEP to climate change beliefs (Hornsey et al., 2016). It should be noted that, as described in the Introduction, our study did not measure NEP endorsement; it was referenced solely for theoretical justification. The discrepancy between our theoretical link and the actual link estimated by the SEM suggests that additional moderating factors may be involved. One possibility, drawing on Kelly and Sharot (2021), is that some of the respondents with stronger self-nature connection may have been more susceptible to hedonic avoidance of distressing information about human-caused climate change and its adverse global impacts. This may have counteracted cognitive engagement (i.e., individuals with stronger nature connection may be more cognitively engaged with environmental issues, increasing their likelihood of seeking climate-related information), thereby weakening the relationship between nature connection and climate change beliefs. Nevertheless, this interpretation remains speculative as our study did not directly assess motives for information-seeking.

Alternatively, the discrepancies between our findings and those of

the existing literature can also be ascribed to different measures of nature connection. Our present study employed the EINS questionnaire to measure self-nature connection (Martin & Czellar, 2016). The EINS was developed on the basis of the INS questionnaire (Schultz, 2001), and meta-analysis research has shown that the INS score had one of the weakest associations (among measures of nature connection) with pro-environmental behavior (Whitburn et al., 2020). Consequently, our use of the EINS, as opposed to other measures, may partly explain the non-significant relationship in our study between self-nature connection and climate policy support. Note that this interpretation assumes that our findings on climate policy support as a pro-environmental attitude can be meaningfully compared to those on pro-environmental behaviors so far reported in the literature.

5.5. Limitations

This study has nevertheless several limitations. First, the results of our cross-sectional survey prevent us from claiming any causal relationships between the predictor variables and the outcome variables. For example, we found that higher adulthood nature exposure predicted stronger climate change beliefs and climate policy support (in both resource and infrastructure categories). However, we cannot conclude whether greater nature exposure enhanced individuals' climate change beliefs and policy support, or whether individuals' intrinsic climate change beliefs or willingness to support climate policies led them to expose themselves to natural environments. It remains for future studies to address this research gap.

Second, the content validity of the questionnaires used to measure adulthood and childhood nature exposure may be limited. Although the five-item versions of the NES-II and RNES-II are established scales (Wood et al., 2019), they measure subjective aspects only; they do not account for objective nature exposure, such as the number of indoor plants or the type of view from the window (cf. Korpela et al., 2017). In addition, these questionnaires do not distinguish between incidental (e.g., neighborhood greenspace exposure), intentional (e.g., visits to natural spaces), and indirect (e.g., television programs) contact with nature (cf. Alcock et al., 2020; Martin et al., 2020). In the NES-II and RNES-II, the first two categories (incidental and intentional contact) were aggregated, and the third (indirect contact) was not included. To address these limitations, future research should employ more fine-grained measures of nature exposure, distinguishing between subjective and objective exposure and accounting for differences in incidental, intentional, and indirect exposures.

Third, the two questions about political liberalism (economic/social issues), which were used in our present study, were formulated by researchers based at US universities who led the implementation of the main survey (Vlasceanu et al., 2024), and therefore may not have been optimal for our Finnish respondents. The vast majority of studies on the relationships between political orientation and environmental concern and climate policy support has been conducted in the US, where liberals (Democrats) have been more pro-environmental than conservatives (Republicans) (Cruz, 2017; O'Connor et al., 2002), and political orientation may serve as a predictor at least in that country. However, our mixed results imply that the conservative-liberal spectrum in Finland may not necessarily have corresponded to the degree of pro-environmentalism so well as in the US. Future studies targeting non-US populations can consider alternative ways of measuring respondents' political orientation as a covariate in models predicting climate change beliefs and climate policy support. It would also be worth comparing Finnish samples with those in the US or Australia, where people's climate change beliefs and climate policy support are more likely to be affected by partisan and ideological identities (Doell et al., 2021).

Finally, our sample may have been affected by self-selection bias. Our study was designed so that the three predictors (adulthood nature exposure, childhood nature exposure, and domicile) and the first

mediator (self-nature connection) were measured in an additional survey appended to the primary survey conducted for Vlasceanu et al. (2024). Participation in the additional survey was optional, thus respondents continuing to the additional survey may have been more interested in topics related to nature exposure/connection than those who discontinued. Due to the lack of data from potential dropouts at the transition phase from the primary survey to the additional survey, we cannot formally test for self-selection bias. However, our study design likely reduced the risk of such bias. First, the additional survey was much briefer (approximately 5 min to complete) than the primary survey (around 30 min). Second, information on all key demographic variables (age, gender, income, education, and political liberalism regarding economic/social issues) was collected in the primary survey and was statistically controlled for in our model. While this helps mitigate the potential impact of unobserved self-selection, we acknowledge that unmeasured individual differences, e.g., in environmental interest, may still influence participation and merit attention in future research.

6. Conclusions

Although causality cannot be determined due to the correlational nature of this study, our findings yield two testable hypotheses for future longitudinal intervention research: (1) Promoting adulthood nature exposure would strengthen beliefs in human-caused climate change and its associated threats, regardless of childhood nature exposure. (2) These strengthened beliefs would, in turn, inspire greater support for climate policies. Empirically testing these proposed causal relationships will further enhance our understanding of how to mitigate and adapt to climate change.

CRedit authorship contribution statement

Yasushi Suko: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Reeta Kankaanpää:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation. **Simone Grassini:** Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used ChatGPT for minor language refinements. After using this tool, a professional proofreader conducted a language review of the entire article, and the authors reviewed and edited the content as needed, taking full responsibility for the content of the publication.

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Declaration of competing interest

We have no conflicts of interest to disclose.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jenvp.2025.102652>.

References

- Alcock, I., White, M. P., Pahl, S., Duarte-Davidson, R., & Fleming, L. E. (2020). Associations between pro-environmental behaviour and neighbourhood nature, nature visit frequency and nature appreciation: Evidence from a nationally representative survey in England. *Environment International*, 136, Article 105441. <https://doi.org/10.1016/j.envint.2019.105441>
- Anderson, B., Böhmelt, T., & Ward, H. (2017). Public opinion and environmental policy output: A cross-national analysis of energy policies in Europe. *Environmental Research Letters*, 12(11), Article 114011. <https://doi.org/10.1088/1748-9326/aa8f80>
- Bergquist, M., Nilsson, A., Harring, N., & Jagers, S. C. (2022). Meta-analyses of fifteen determinants of public opinion about climate change taxes and laws. *Nature Climate Change*, 12(3), 235–240. <https://doi.org/10.1038/s41558-022-01297-6>
- Bretter, C., & Schulz, F. (2024). Climate policy support in the UK: An interaction of worldviews and policy types. *Policy Studies Journal*, 12570. <https://doi.org/10.1111/psj.12570>
- Bumann, S. (2021). What are the determinants of public support for climate policies? A review of the empirical literature. *Review of Economics*, 72(3), 213–228. <https://doi.org/10.1515/roe-2021-0046>
- Burstein, P. (Ed.). (2021). The impact of public opinion on public policy: A review and an agenda. *Political Research Quarterly*, 56(1), 29–40. <https://doi.org/10.1177/106591290305600103>
- Cheng, J. C.-H., & Monroe, M. C. (2012). Connection to nature: Children's affective attitude toward nature. *Environment and Behavior*, 44(1), 31–49. <https://doi.org/10.1177/10013916510385082>
- Cleary, A., Fielding, K. S., Murray, Z., & Roiko, A. (2020). Predictors of nature connection among urban residents: Assessing the role of childhood and adult nature experiences. *Environment and Behavior*, 52(6), 579–610. <https://doi.org/10.1177/0013916518811431>
- Cruz, S. M. (2017). The relationships of political ideology and party affiliation with environmental concern: A meta-analysis. *Journal of Environmental Psychology*, 53, 81–91. <https://doi.org/10.1016/j.jenvp.2017.06.010>
- Davis, J. L., Green, J. D., & Reed, A. (2009). Interdependence with the environment: Commitment, interconnectedness, and environmental behavior. *Journal of Environmental Psychology*, 29(2), 173–180. <https://doi.org/10.1016/j.jenvp.2008.11.001>
- DeVille, N. V., Tomasso, L. P., Stoddard, O. P., Wilt, G. E., Horton, T. H., Wolf, K. L., Brymer, E., Kahn, P. H., & James, P. (2021). Time spent in nature is associated with increased pro-environmental attitudes and behaviors. *International Journal of Environmental Research and Public Health*, 18(14), 7498. <https://doi.org/10.3390/ijerph18147498>
- Dietz, T., Dan, A., & Shwom, R. (2007). Support for climate change policy: Social psychological and social structural influences. *Rural Sociology*, 72(2), 185–214. <https://doi.org/10.1526/003601107781170026>
- Doell, K. C., Pärnamets, P., Harris, E. A., Hackel, L. M., & Van Bavel, J. J. (2021). Understanding the effects of partisan identity on climate change. *Current Opinion in Behavioral Sciences*, 42, 54–59. <https://doi.org/10.1016/j.cobeha.2021.03.013>
- Doell, K. C., Todorova, B., Vlasceanu, M., Bak Coleman, J. B., Pronizius, E., Schumann, P., Azevedo, F., Patel, Y., Berkebile-Wineberg, M. M., Brick, C., Lange, F., Grayson, S. J., Pei, Y., Chakroff, A., Van Den Broeck, K. L., Lamm, C., Vlasceanu, D., Constantino, S. M., Rathje, S., ... Van Bavel, J. J. (2024). The international climate psychology collaboration: Climate change-related data collected from 63 countries. *Scientific Data*, 11(1), 1066. <https://doi.org/10.1038/s41597-024-03865-1>
- Drewns, S., & Van Den Bergh, J. C. J. M. (2016). What explains public support for climate policies? A review of empirical and experimental studies. *Climate Policy*, 16(7), 855–876. <https://doi.org/10.1080/14693062.2015.1058240>
- Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New trends in measuring environmental attitudes: Measuring endorsement of the new ecological Paradigm: A revised NEP scale. *Journal of Social Issues*, 56(3), 425–442. <https://doi.org/10.1111/0022-4537.00176>
- Evans, G. W., Otto, S., & Kaiser, F. G. (2018). Childhood origins of young adult environmental behavior. *Psychological Science*, 29(5), 679–687. <https://doi.org/10.1177/0956797617741894>
- Evers, A.-M., Lindén, L., & Rappe, E. (2000). A review of human issues in horticulture in Finland: Urbanization motivates a renewed appreciation for plants and nature. *HortTechnology*, 10(1), 24–26. <https://doi.org/10.21273/HORTTECH.10.1.24>
- Ewert, A., Place, G., & Sibthorp, J. (2005). Early-life outdoor experiences and an individual's environmental attitudes. *Leisure Sciences*, 27(3), 225–239. <https://doi.org/10.1080/01490400590930853>
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149–1160. <https://doi.org/10.3758/BRM.41.4.1149>
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191. <https://doi.org/10.3758/BF03193146>
- Frumkin, H., Bratman, G. N., Breslow, S. J., Cochran, B., Kahn Jr, P. H., Lawler, J. J., Levin, P. S., Tandon, P. S., Varanasi, U., Wolf, K. L., & Wood, S. A. (2017). Nature contact and human health: A research agenda. *Environmental Health Perspectives*, 125(7), Article 075001. <https://doi.org/10.1289/EHP1663>
- Furness, E. (2021). Understanding the lived experience of connection to nature. *Conservation Science and Practice*, 3(7), Article e440. <https://doi.org/10.1111/csp2.440>
- Gallucci, M., & Jentschke, S. (2021). SEMlj: Jamovi SEM analysis [jamovi module] <https://semlj.github.io/>
- Gkargavouzi, A., Halkos, G., & Matsiori, S. (2019). A multi-dimensional measure of environmental behavior: Exploring the predictive power of connectedness to nature, ecological worldview and environmental concern. *Social Indicators Research*, 143(2), 859–879. <https://doi.org/10.1007/s11205-018-1999-8>
- Grassini, S., Suko, Y., & Kankaanpää, R. (2022). Individual factors predicting support to policies aimed at mitigating climate change [Preregistration form]. *OSF Registries*. <https://doi.org/10.17605/OSF.IO/4UGNJ>
- Häkkinen, L., Ilgin, H. E., & Karjalainen, M. (2022). Cottage culture in Finland: Development and perspectives. *Encyclopedia*, 2(2), 705–716. <https://doi.org/10.3390/encyclopedia2020049>
- Hakoköngäs, E., & Puhakka, R. (2023). Happiness from nature? Adolescents' conceptions of the relation between happiness and nature in Finland. *Leisure Sciences*, 45(7), 665–683. <https://doi.org/10.1080/01490400.2021.1877584>
- Hayes, A. F., & Scharkow, M. (2013). The relative trustworthiness of inferential tests of the indirect effect in statistical mediation analysis: Does method really matter? *Psychological Science*, 24(10), 1918–1927. <https://doi.org/10.1177/0956797613480187>
- Hinkin, T. R. (1998). A Brief tutorial on the development of measures for use in survey questionnaires. *Organizational Research Methods*, 1(1), 104–121.
- Hornsey, M. J., Harris, E. A., Bain, P. G., & Fielding, K. S. (2016). Meta-analyses of the determinants and outcomes of belief in climate change. *Nature Climate Change*, 6(6), 622–626. <https://doi.org/10.1038/nclimate2943>
- IPCC. (2023). Climate change 2023: Synthesis report. In Core Writing Team, H. Lee, & J. Romero (Eds.), *Contribution of working groups I, II and III to the sixth assessment report of the intergovernmental panel on climate change* (p. 184 pp.). Switzerland. (First: Intergovernmental Panel on Climate Change (IPCC). <https://doi.org/10.59327/IPCC/AR6-9789291691647>. IPCC, Geneva, Switzerland.
- Kelly, C. A., & Sharot, T. (2021). Individual differences in information-seeking. *Nature Communications*, 12(1), 7062. <https://doi.org/10.1038/s41467-021-27046-5>
- Korpela, K., Nummi, T., Lipiäinen, L., De Bloom, J., Sianoja, M., Pasanen, T., & Kinnunen, U. (2017). Nature exposure predicts well-being trajectory groups among employees across two years. *Journal of Environmental Psychology*, 52, 81–91. <https://doi.org/10.1016/j.jenvp.2017.06.002>
- Loy, L. S., & Reese, G. (2019). Hype and hope? Mind-Body practice predicts pro-environmental engagement through global identity. *Journal of Environmental Psychology*, 66, Article 101340. <https://doi.org/10.1016/j.jenvp.2019.101340>
- Martin, C., & Czellar, S. (2016). The extended inclusion of nature in self scale. *Journal of Environmental Psychology*, 47, 181–194. <https://doi.org/10.1016/j.jenvp.2016.05.006>
- Martin, L., White, M. P., Hunt, A., Richardson, M., Pahl, S., & Burt, J. (2020). Nature contact, nature connectedness and associations with health, wellbeing and pro-environmental behaviours. *Journal of Environmental Psychology*, 68, Article 101389. <https://doi.org/10.1016/j.jenvp.2020.101389>
- Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology*, 24(4), 503–515. <https://doi.org/10.1016/j.jenvp.2004.10.001>
- Neuvonen, M., Sievänen, T., Tönnies, S., & Koskela, T. (2007). Access to green areas and the frequency of visits – a case study in Helsinki. *Urban Forestry and Urban Greening*, 6(4), 235–247. <https://doi.org/10.1016/j.ufug.2007.05.003>
- O'Connor, R. E., Bord, R. J., Yarnal, B., & Wiefek, N. (2002). Who wants to reduce greenhouse gas emissions? *Social Science Quarterly*, 83(1), 1–17. <https://doi.org/10.1111/1540-6237.00067>
- Perrin, J. L., & Benassi, V. A. (2009). The connectedness to nature scale: A measure of emotional connection to nature? *Journal of Environmental Psychology*, 29(4), 434–440. <https://doi.org/10.1016/j.jenvp.2009.03.003>
- Pitkänen, K. (2008). Second-home landscape: The meaning(s) of landscape for second-home tourism in Finnish lakeland. *Tourism Geographies*, 10(2), 169–192. <https://doi.org/10.1080/14616680802000014>
- R Core Team. (2024). *R: a language and environment for statistical computing*. R Foundation for Statistical Computing [Computer software] Version 4.4. <https://cran.r-project.org/>
- Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, 48(2), 1–36. <https://doi.org/10.18637/jss.v048.i02>
- 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. <https://doi.org/10.1006/jenvp.2001.0227>
- Schultz, P. W. (2002). Inclusion with nature: The psychology of human-nature relations. In P. Schumuck, & P. W. Schultz (Eds.), *Psychology of sustainable development* (pp. 61–78). Springer US. https://doi.org/10.1007/978-1-4615-0995-0_4
- Sherman, A. K., Rowe, A. J., Bird, S., Powers, S., & Legault, L. (2016). Motivational orientation explains the link between political ideology and proenvironmental behavior. *Ecopsychology*, 8(4), 239–249. <https://doi.org/10.1089/eco.2016.0029>
- Sorvali, J., Kaseva, J., & Peltonen-Sainio, P. (2021). Farmer views on climate change—a longitudinal study of threats, opportunities and action. *Climatic Change*, 164(3–4), 50. <https://doi.org/10.1007/s10584-021-03020-4>
- Stehl, P., White, M. P., Vitale, V., Pahl, S., Elliott, L. R., Fian, L., & Van Den Bosch, M. (2024). From childhood blue space exposure to adult environmentalism: The role of nature connectedness and nature contact. *Journal of Environmental Psychology*, 93, Article 102225. <https://doi.org/10.1016/j.jenvp.2023.102225>
- Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review*, 6(2), 81–97.
- Syropoulos, S., & Markowitz, E. (2024). Responsibility towards future generations is a strong predictor of proenvironmental engagement. *Journal of Environmental Psychology*, 93, Article 102218. <https://doi.org/10.1016/j.jenvp.2023.102218>
- The Jamovi Project. (2024). *Jamovi (Version 2.6) [Computer software]*. Retrieved from <http://www.jamovi.org>

- Thøgersen, J., Vatn, A., & Aasen, M. (2024). The chicken or the egg? Spillover between private climate action and climate policy support. *Journal of Environmental Psychology*, 99, Article 102434. <https://doi.org/10.1016/j.jenvp.2024.102434>
- Urbanyi-Popiolek, I. (2019). Cruise industry in the Baltic Sea Region, the challenges for ports in the context of sustainable logistics and ecological aspects. *Transportation Research Procedia*, 39, 544–553. <https://doi.org/10.1016/j.trpro.2019.06.056>
- Usluer, F., Barca, O., Karakaya, S., Demir, F., & Bayram Arlı, N. (2023). Explanation of behavioral intentions to mitigate climate change with protection motivation theory. *Journal of Economy Culture and Society*, 0(0). <https://doi.org/10.26650/JECS2023-1300199>, 0–0.
- Van Heezik, Y., Freeman, C., Falloon, A., Buttery, Y., & Heyzer, A. (2021). Relationships between childhood experience of nature and green/blue space use, landscape preferences, connection with nature and pro-environmental behavior. *Landscape and Urban Planning*, 213, Article 104135. <https://doi.org/10.1016/j.landurbplan.2021.104135>
- Vepsäläinen, M., & Pitkänen, K. (2010). Second home countryside. Representations of the rural in Finnish popular discourses. *Journal of Rural Studies*, 26(2), 194–204. <https://doi.org/10.1016/j.jrurstud.2009.07.002>
- Vlasceanu, M., Doell, K. C., Bak, J. B., Todorova, B., Berkebile, M. M., Grayson, S. J., Patel, Y., Goldwert, D., Pei, Y., Chakroff, A., Pronizius, E., Constantino, S., Morais, M. J., Schumann, P., Rathje, S., Fang, K., Aglioti, S. M., Alfano, M., Alvarado, A. J., ... Pearson, A. R. (2024). Addressing climate change with behavioral science: A global intervention tournament in 63 countries. *Science Advances*, 10(6), Article eadj5778. <https://doi.org/10.1126/sciadv.adj5778>
- Wang, J., Geng, L., Schultz, P. W., & Zhou, K. (2019). Mindfulness increases the belief in climate change: The mediating role of connectedness with nature. *Environment and Behavior*, 51(1), 3–23. <https://doi.org/10.1177/0013916517738036>
- Whitburn, J., Linklater, W., & Abrahamse, W. (2020). Meta-analysis of human connection to nature and proenvironmental behavior. *Conservation Biology*, 34(1), 180–193. <https://doi.org/10.1111/cobi.13381>
- Wood, C., Barron, D., & Smyth, N. (2019). The current and retrospective intentional nature exposure scales: Development and factorial validity. *International Journal of Environmental Research and Public Health*, 16(22), 4443. <https://doi.org/10.3390/ijerph16224443>
- Zylstra, M. J., Knight, A. T., Esler, K. J., & Le Grange, L. L. L. (2014). Connectedness as a core conservation concern: An interdisciplinary review of theory and a call for practice. *Springer Science Reviews*, 2(1–2), 119–143. <https://doi.org/10.1007/s40362-014-0021-3>