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From experience to action: Correlates of Lithuanian citizens' engagement in climate adaptation

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ABSTRACT

Background: Climate adaptation requires action at institutional and individual levels. Citizens' engagement differs widely across sociocultural and geographic contexts and remains under-researched.
Aim: The purpose of the study was to examine correlates of Lithuanian adults' adaptation actions, using a nationally representative survey adapted from Brink and Wamsler's instrument (2019) in Sweden.
Methods: Data were collected via face-to-face interviews in Lithuania (October–November 2023; $N = 1013$). Measures included climate-related hazard experience (recent 5 years and lifetime), climate change concern (single item), cultural worldviews, adaptation motivation, and self-reported adaptation actions. We tested measurement structure with CFA, used Independent-samples *t*-tests for group differences (gender; hazard experience), and estimated multivariate associations using multiple regression and an exploratory SEM summarizing hazard experience–concern–action associations.
Results: Independent samples' *t*-test showed that individuals with prior climate-related hazard experiences ($n = 259$, 26%) in comparison to individuals who have never experienced a climate-related hazard ($n = 754$, 74%), scored overall higher on climate change concern, motivation to adapt, and adaptation actions ($p < .001$). Women reported slightly higher climate concern than men ($d = 0.17$), while men reported slightly more technical actions ($d = 0.22$). Using exploratory structural equation modeling (SEM), it was found that recent hazard experience showed the strongest association with adaptation actions in multivariate models (standardized $\beta \approx 0.30$, $p < .001$), while concern showed a small association with actions when considered alongside experience and motivation (standardized $\beta \approx 0.08$–0.12).
Conclusions: In Lithuania, recent lived experience with climate-related hazards and stronger motivation are robust correlates of adaptation actions, whereas climate concern alone is a comparatively weak correlate once other factors are considered. The findings are correlational and should be interpreted as associations rather than evidence of causal direction.

1. Introduction

Climate adaptation is commonly defined as the process of adjusting to actual or expected climate and its effects in order to reduce harm or exploit beneficial opportunities and can occur through policies, infrastructure, institutions, communities, and households (IPCC, 2014, 2022). Institutional adaptation (e.g., urban planning, early warning systems, building standards, insurance design) and household actions (e.g., preparing for storms, heat protection, safeguarding property) are interdependent. Institutional action can enable or constrain household action, and household action can complement institutional strategies. However, neither level alone can deliver resilient outcomes, especially where resources and access are unequally distributed. Synchronized adaptation measures can manage the impacts of climate-related natural hazards, such as extreme temperatures, heavy precipitation, droughts, wildfires, windstorms, and flooding, which affect approximately 3.3–3.6 billion people worldwide and lead to substantial economic losses (about 0.29% of global Gross Domestic Product per year) as well as damage to health and property (Maes, 2022).

At the systemic and infrastructural level, climate adaptation involves making environments and built systems more resilient to extreme events by strengthening coastal and river flood defenses, upgrading buildings

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and transportation networks, and modifying energy and water-management systems (Gijsman et al., 2021; Howden et al., 2007; Wamsler et al., 2017). Examples include constructing seawalls to protect coastal cities, improving irrigation and drainage systems, implementing early warning systems, and introducing drought-tolerant or heat-resistant plant varieties (Begum et al., 2022; Howden et al., 2007). Climate-informed urban planning, revised zoning, and adapted insurance schemes also play a key role (Brink and Wamsler, 2018; Runhaar et al., 2018; Wamsler et al., 2023). Despite numerous initiatives, however, current adaptation efforts are often described as modest and fragmented, insufficient in scale and scope (Karbassi et al., 2011; Runhaar et al., 2018; Wamsler et al., 2023; Weir, 2015), and they have not yet achieved widespread reductions in climate risks (Formetta and Feyen, 2019; Jastrzębska, 2023; Sawatzky et al., 2021; Woroniecki et al., 2019a, 2019b).

Nonetheless, climate adaptation is a driver of sustainable development (Chuvieco et al., 2021; Jaspal et al., 2014; Wamsler et al., 2021), as it can also catalyze modernization of infrastructure, improve organizational leadership, and foster innovation. Many adaptation measures create co-benefits that align with broader societal goals: for example, expanding urban green spaces to manage heat or flooding can simultaneously enhance liveability, improve air quality, and support recreation and tourism. Thus, while climate change poses severe risks, adapting to it can also drive positive changes, turning climate challenges into catalysts for innovation and cooperation.

Alongside numerous structural measures, individual and household adaptation actions are crucial components of overall resilience. Such actions include safeguarding one's property against floods (e.g., installing pumps or storm-proofing), adjusting behaviour during heatwaves or storms (e.g., caring for vulnerable neighbors, securing loose objects), purchasing or revising insurance, supporting community preparedness initiatives, and even relocating from high-risk areas. Citizens' engagement in these adaptation behaviors is essential to complement governmental and infrastructural efforts, yet it remains underresearched in many sociocultural and geographical contexts.

Household-level adaptation is often shaped by lived experience of hazards, perceptions of risk, and motivation to act. Psychological barriers, such as denial, disengagement, or feelings of futility, can limit action even where risks are recognized (Gifford, 2011). Conversely, lived experience of hazards may make climate risks more concrete and personally salient, potentially strengthening motivation and preparedness behaviour. However, emerging longitudinal evidence suggests these relationships may be reciprocal and context-dependent rather than unidirectional (Ai et al., 2024; Veijonaho et al., 2025).

There is growing recognition of the need for research on climate change adaptation (Hoddy et al., 2023) to develop effective strategies and measures in diverse geographical contexts (Carvalho and Spataru, 2024; Hagen et al., 2023; Li et al., 2021; Reiter et al., 2022; Sinore and Wang, 2024). The present study focuses specifically on individual- and household-level adaptation behaviors. Lithuania is used as a case to examine how citizens' experiences, mindsets, and motivations are associated with climate adaptation actions.

Several decades ago, psychoanalyst Karen Horney remarked that “we may feel genuinely concerned about world conditions, though such a concern should drive us into action and not into a depression” (Horney, 2013, p. 10). This insight is particularly pertinent to climate change. Governments, organizations, and researchers are actively developing measures to protect societies from growing climate-related threats (Göpfert et al., 2019; Hoddy et al., 2023; Runhaar et al., 2018; Wamsler et al., 2023; Wamsler and Brink, 2014). At the same time, an important set of enablers lies in citizens' mindsets and everyday behaviors (Böhme et al., 2022; Brink and Wamsler, 2018; Hegger et al., 2022; Kiss et al., 2022; Wamsler et al., 2021; Wamsler and Brink, 2018; Wamsler and Bristow, 2022; Wamsler et al., 2020).

The present study examines individual-level adaptation in Lithuania, focusing on the psychological correlates of citizens' adaptation actions. The work is situated within the literature on behavioral adaptation, risk perception, and pro-environmental action, rather than within infrastructural or policy design.

1.1. Literature review

1.1.1. Theoretical frameworks

Building on behavioral science, this study frames climate adaptation at the individual level which can be approached through a combination of theories.

According to the Theory of Planned Behaviour (TPB), behaviour is driven by attitudes, subjective norms, and perceived behavioral control, which together shape intentions (Ajzen, 2020). In adaptation contexts, for example, farmers adopting new practices or homeowners investing in retrofits, perceived control and cost–benefit perceptions often strongly influence intentions and actions. Individuals who believe they can effectively reduce climate-related risks, and who perceive adaptation as feasible and worthwhile, are more likely to engage in protective behaviors.

The Value–Belief–Norm (VBN) theory outlines a chain from core values (biospheric, altruistic, egoistic) to ecological worldviews, awareness of consequences, ascription of responsibility, and personal norms, which in turn motivate pro-environmental action (Fornara et al., 2020). VBN is especially useful for explaining collective or altruistic adaptation behaviors, such as community flood preparation or conservation efforts, that are driven by moral obligation rather than personal gain.

Both TPB and VBN offer complementary insights for individual adaptation actions (A. M. van Valkengoed et al., 2024). Meta-analytic evidence across more than 100 studies indicates that efficacy beliefs (the belief that one can effectively reduce risk) tend to be among the strongest correlates of adaptive action, while perceived risk or concern provides motivation but often requires a sense of control to translate into action (A. M. van Valkengoed and Steg, 2019; Fornara et al., 2020; Walawalkar et al., 2023). In other words, people generally need both motivation (e.g., concern, values, social norms) and perceived efficacy to move from intention to actual adaptation behaviour.

Self-Determination Theory (SDT) emphasizes intrinsic and extrinsic motivations, which can be linked to how individuals perceive climate risks and their responsibilities toward adaptation. For instance, motivations can stem from personal experiences with climate hazards, which enhance the likelihood of adaptive actions (A. M. van Valkengoed and Steg, 2019).

Protection Motivation Theory (PMT) suggests that individuals protect themselves based on their perceptions of threat severity, vulnerability, response efficacy, and self-efficacy, and PMT alongside with TPB explains how rational judgments and climate experiences influence adaptation behaviors among herders (Baselt et al., 2025; A. M. van Valkengoed and Steg, 2019).

Integrative Worldview Framework (IWF) categorizes worldviews into traditional, modern, postmodern, and integrative, and explores their influence on opinions and behaviors regarding climate change. His framework was used to map worldviews and their relationship with climate change opinions and behaviors in the Netherlands and the USA, showing that postmodern and integrative worldviews are associated with higher concern and sustainable behaviors (De Witt et al., 2016; Cai et al., 2024; Lawrence et al., 2024).

Social Identity Theory suggests that individuals' social identities influence their perceptions and behaviors, including their responses to climate risks. Social identity was found to mediate between risk perception and adaptation among farmers, influencing their motivation to adapt based on group affiliations and perceived credibility of information sources (Frank et al., 2011).

Cultural Theory highlights how cultural worldviews and myths about nature affect perceptions of climate change risks. This theory can help identify barriers to adaptation by understanding how different

communities conceptualize climate impacts and their responses.(Ead et al., 2022; McNeeley and Lazrus, 2014; Navas-Martín et al., 2024; Waring et al., 2023).

The Social-Ecological Model (SEM) emphasizes the interconnectedness of social and ecological systems, suggesting that adaptation is not solely an individual decision but a collective process influenced by various social factors. This model can help identify how community dynamics and ecological relationships impact adaptation strategies (Bai et al., 2024; Herreros-Cantis et al., 2025).

A comprehensive approach that integrates these theories can provide a better understanding of climate adaptation and reveal that personal motivations and behaviors are shaped by various factors (Wamsler and Osberg, 2022).

We use these theoretical frameworks as sensitising lenses rather than models being tested. Core theoretical constructs of these theories are not directly measured here; therefore, we do not claim to test theoretical presumptions, and the study design is not based on any specific theory. Instead, this study is a replication of the original Swedish study (Brink and Wamsler, 2019a, 2019b) in Lithuanian context to examine correlational patterning among hazard experience, concern, worldviews, motivation, and actions (Ajzen, 2020; Fornara et al., 2020; van Valkengoed and Steg, 2019).

1.1.2. Individual - level adaptation: the main correlates

Worldviews. Prior research highlights several individual - level correlates of climate adaptation: citizens' worldviews, categorized as hierarchist, communitarian/egalitarian, individualist, fatalist, or indifferent toward climate change, reflect deeply held beliefs about society and nature (Brink and Wamsler, 2019a, 2019b; da Rosa, 2022; Dake, 1992; Ivashkiv et al., 2020). These worldviews shape how individuals interpret climate risks, how responsible they feel, and how urgent action seems. For example, communitarian (egalitarian) worldviews emphasize collective responsibility and may align with stronger support for climate action, whereas fatalist or indifferent views (e.g., believing climate change is exaggerated or distant) may impede action. Mental barriers such as denial, fatalism, or perceived inability to influence outcomes are considered among the most significant hurdles to climate action (Gifford, 2011; Böhme et al., 2022).

Values. Previous studies have also analyzed environmental values (Liefländer et al., 2013; Regmi et al., 2020; Schönfelder and Bogner, 2020), environmental attitudes (Ajdukovic et al., 2019), and their links to environmental responsibility (Ivashkiv et al., 2020; Xu et al., 2022; Yang et al., 2022) and climate-related behaviour (Baron and Ghelich Khani, 2021; Chen, 2019; Doyle, 2018; Huang, 2016; Kapeller and Jäger, 2020; Navarro et al., 2020). These studies demonstrated that values play a significant role in environmental decision-making, with biospheric and altruistic values promoting sustainable behaviors. Besides, environmental values have been linked to environmental preservation (Ajdukovic et al., 2019), citizen engagement in climate adaptation (Brink and Wamsler, 2019a, 2019b), and attitudes (Sawatzky et al., 2021).

Climate change concern. Climate change concern represents a cognitive appraisal of the potential threat due to environmental issues such as pollution, deforestation, and biodiversity loss (Ágoston et al., 2022; Jain and Jain, 2022; Lutz et al., 2023). Such concern is associated with perceptions of rapid environmental change, the impacts of human activities on the planet, and potential consequences for future generations, and can be followed by distress of being unable to control or influence environmental outcomes (Lutz et al., 2023). However, when coupled with a sense of efficacy, distress about environmental threats can be channeled into proactive adaptation and sustainability initiatives (Pihkala, 2020).

Motivation for adaptation. Motivational factors in climate change adaptation have also been examined, including their relationships with worldviews (da Rosa, 2022) and sustainable motivational behaviour (Chen, 2019). Prior research has shown that past experiences can impact pro-ecological commitment and nature conservation (Brügger et al., 2016). However, studies on the links between past climate-related hazard experiences, adaptation motivation, worldviews, and adaptation actions have produced inconsistent findings (Brink and Wamsler, 2019a, 2019b; Wamsler and Bristow, 2022; Woroniecki et al., 2019a, 2019b). Moreover, while awareness of the need for climate adaptation is generally high, a variety of challenges continue to limit the translation of plans into concrete actions (A. M. van Valkengoed et al., 2024).

Citizen engagement. Another widely recognized correlate of climate adaptation is citizen engagement (Hegger et al., 2022; Kiss et al., 2022; Ramstetter and Habersack, 2023; Wamsler and Bristow, 2022; Woroniecki et al., 2019a, 2019b). Citizen engagement in this context refers to the active participation of individuals and communities in adjusting to actual or expected climate and its effects (IPCC, 2014, 2022), through both individual actions and collective initiatives. Prior research indicates that citizen engagement can significantly promote climate adaptation actions (Brink and Wamsler, 2019a, 2019b). However, there remains a lack of evidence on the specific psychological and experiential factors that facilitate or hinder citizen engagement in adaptation, particularly across diverse sociocultural and geographical settings. Citizens' engagement in climate adaptation, together with their past climate-related experiences (e.g., exposure to hazards), beliefs, levels of concern, motivations, and adaptive actions, remains insufficiently examined, notwithstanding some highly influential contributions (Brink and Wamsler, 2019a, 2019b; De Witt et al., 2016; Tolppanen et al., 2022a, 2022b). Addressing this gap is essential for designing interventions and policies that effectively mobilize citizens as partners in climate adaptation.

Personal hazard experience. Another key factor linked to adaptation is direct experience with climate-related hazards. Experiencing extreme weather events firsthand can heighten risk perception and prompt personal protective actions. People who have lived through floods, storms, or heatwaves often show greater awareness and concern about climate risks and may be more willing to undertake adaptive measures. However, evidence on how hazard experience interacts with other factors, such as worldview, motivation, and behaviour, is mixed (Brink and Wamsler, 2019a, 2019b; Wamsler and Bristow, 2022; Woroniecki et al., 2019a, 2019b). In some cases, hazard experiences reinforce pro-environmental beliefs and commitments (Diniz et al., 2018), while in others the link is weaker or context dependent.

Recent longitudinal findings in related areas of pro-environmental behaviour and risk perception also suggest that relationships between experiences, worldviews, concern, and behaviour can be bidirectional rather than strictly one-way (Veijonaho et al., 2025): pre-existing worldviews and beliefs may shape how people perceive and remember hazards, which in turn may influence subsequent concern and actions. This evidence underscores that any directional models must be treated as theory-guided approximations rather than definitive causal sequences, especially in cross-sectional survey research.

Taken together, individual adaptation behaviour is related to a combination of motivational factors (e.g., perceived benefits, moral norms), concern (climate anxiety or worry), cognitive factors (risk perception, efficacy beliefs), worldviews, and personal experiences.

1.2. Aims and research questions

The present study aims to explore the factors of citizen engagement in climate adaptation in Lithuania, focusing on the individual - level correlates of adaptation actions. Specifically, the study examines associations between citizens' climate-related hazard experiences, worldviews, climate change concerns, climate adaptation motivation, and adaptation actions in a nationally representative Lithuanian sample.

To do so, we replicate the survey on citizens' engagement in climate adaptation conducted by Brink and Wamsler (2019a, 2019b) in Sweden, applying their methodology in the Lithuanian context. This allows to highlight potential sociocultural specificities and consider the extent to

which patterns observed in Sweden are reproduced in a different environment.

The study addresses the following research questions:

RQ1: How are individuals' experiences of climate-related hazards related to their engagement in adaptive actions?

RQ2: How do worldviews, climate change concern, and adaptation motivation relate to hazard experiences and to adaptation actions?

RQ3: Do individual factors (worldviews, concern, motivation, and actions) differ between different groups (e.g., those with vs. without hazard experience, or men vs. women)?

1.3. Hypotheses

Based on the literature and on findings from the original Swedish study (Brink and Wamsler, 2019a, 2019b), we formulated seven hypotheses (H1–H7). Three hypotheses focus on group differences (gender and hazard experience), and four focus on patterns of associations among the study variables. These hypotheses specify plausible directional relationships grounded in TPB and VBN, but we explicitly treat them as theory-based association models rather than definitive causal claims.

H1 (Gender differences). Given previous evidence of gender differences in motivational factors, where men respondents were more predisposed to economic values and women respondents were more motivated by social values, particularly those aligned with communitarian worldviews (Brink and Wamsler, 2019a, 2019b), we hypothesized that women and men would differ in climate change concern, motivation types, worldviews, and adaptation actions.

H2 (Recent hazard experience differences). As past climate-related hazard experiences may trigger climate change concerns, shape worldviews, and contribute to adaptive behaviors, we hypothesized that individuals who have experienced a climate-related hazard in the last five years would report higher climate change concern, distinct worldview profiles, higher adaptation motivation, and more adaptation actions than individuals without such experiences in the last five years.

H3 (Lifetime hazard experience differences). We hypothesized that individuals who have ever experienced a climate-related hazard (at any point in their lifetime) would differ in worldviews, climate change concern, adaptation motivation, and adaptation actions from those who have never experienced such hazards.

H4 (Hazard–concern–action associations). Based on prior research indicating that hazard experiences can heighten concern and relate to action (Brink and Wamsler, 2019a, 2019b; Diniz et al., 2018), we hypothesized positive associations between lifetime climate-related hazard experience, climate change concern, and adaptation actions. Specifically, we expected that individuals with hazard experiences would report higher concern and engage in more adaptation actions.

H5 (Worldview–motivation–action associations). Drawing on the original findings by Brink and Wamsler (2019a, 2019b), and given the role of worldviews and motivation in shaping behaviour (da Rosa, 2022; Fornara et al., 2020), we hypothesized that adaptation actions would be associated with individuals' worldviews and adaptation motivation.

H6 (Correlates of actions). Based on prior research, we hypothesized that adaptation actions would be associated with hazard experiences, concern, worldviews, and motivation.

In the empirical analyses, the paths between the constructs are estimated as an association model, with the recognition that alternative temporal orderings (and reciprocal influences) are plausible.

Taken together, these hypotheses allow us to explore both group differences and structural relationships among the constructs in a Lithuanian context, while providing a direct replication and extension of prior work conducted in Sweden (Brink and Wamsler, 2019a, 2019b).

2. Methods

2.1. Data collection and sample

Data were collected through a representative survey of Lithuanian adults conducted from October 23 to November 7, 2023. The survey was administered via face-to-face interviews by a professional public opinion research firm (“Baltijos Tyrimai”) at 109 sampling locations (31 cities and 43 villages) across the country. A multistage stratified random sampling design was used: first stratifying by region and settlement size to ensure coverage of urban and rural areas in all counties, then randomly selecting households and individuals within each sampling point. The target population was residents of Lithuania aged 18 and older. Participants were approached in person by trained interviewers; participation was voluntary and no monetary incentive was provided.

Out of all eligible individuals contacted, approximately 70% agreed to participate, yielding a final sample of 1013 respondents. This sample size provides a margin of error of about ±3% at the 95% confidence level for population estimates. The sample closely reflects national demographics: 46% of respondents were men (n = 462) and 54% were women (n = 551). Ages ranged from 18 to over 50, with 15% of participants between 18 and 29 years old, 34% between 30 and 49, and 51% aged 50 or older. The vast majority of respondents (91%) identified as ethnically Lithuanian, with small minorities identifying as Russian (3%), Polish (4%), or other nationalities (2%). Educational attainment was diverse (about 18% held a university degree, 27% vocational training, 20% secondary education, etc.), and household incomes ranged across lower, middle, and higher income categories. Participants were geographically dispersed across all major regions of Lithuania (e.g., 30% from Vilnius region, 20% Kaunas, 11% Klaipėda, with smaller proportions from other districts), and about 43% resided in suburban areas, 25% in cities, and 32% in villages. This distribution indicates that the sample was broadly representative of the Lithuanian adult population in terms of key sociodemographic characteristics.

Prior to the interview, all participants provided informed consent after being briefed on the study's purpose and the voluntary, confidential nature of their responses. The research protocol was reviewed and approved by the Ethical Monitoring Board at the Citizen Science Hub, Vilnius Gediminas Technical University (Approval No. CSH-2023-02), in accordance with the principles of the Declaration of Helsinki.

2.1.1. Instruments

We employed a questionnaire originally developed in English by Brink and Wamsler (2019a, 2019b) for assessing citizen engagement in climate adaptation. The instrument was translated into Lithuanian and then back-translated to English by Aelita Skarzauskiene to ensure semantic equivalence and minimize any loss of meaning in translation. Minor wording discrepancies were resolved by the research team.

The survey included several sections measuring climate-related hazard experience, climate change concern, cultural worldviews, motivation for climate adaptation, and self-reported adaptation actions. Established scales and items from Brink and Wamsler (2019a, 2019b) were used, with some adaptations to the Lithuanian context as noted:

Hazard Experience: Participants answered two yes/no questions about exposure to climate-related hazards: (1) “In the last five years, have you or anyone in your household in Lithuania experienced any injury, health issue, or property damage due to extreme weather or climate-related events?” and (2) “Have you or your household ever in your lifetime experienced any such injury, issue, or damage due to extreme weather conditions in Lithuania?” If respondents answered “yes,” they were presented with a checklist of hazard types to indicate which event(s) they experienced. The hazard categories included: sea-induced flood; flooding in a river or lake; sewage overflow caused by heavy rain; mold or property damage from precipitation; storm, lightning, hail, or strong wind; and extreme temperatures (either heatwaves or cold spells). These items allowed us to identify whether the

respondent had recent (past 5-year) and/or any lifetime experience of climate-related hazards, and the types of events encountered.

Climate Change Concern: We measured general concern about climate change with one item: "I am very concerned (worried) about climate change." Participants rated their agreement on a 5-point Likert scale from 1 (totally disagree) to 5 (totally agree). This single-item indicator of climate worry is conceptually related to the notion of climate anxiety, i.e. distress about climate change and its potential consequences (Ágoston et al., 2022; Pihkala, 2020).

Worldviews: We assessed respondents' cultural worldviews using a set of ten statements adapted from Dake (1992) and used by Brink and Wamsler (2019a, 2019b). These statements capture four worldview dimensions:

"Individualist" (e.g., "A free society can only exist by allowing companies to prosper.", "If a person has the get-up-and-go to acquire wealth, that person should have the right to enjoy it.")

"Communitarian" (analogous to egalitarian; e.g., "I support stricter legislation to make people behave more climate-friendly.", "If the world were more egalitarian, climate change would not be such a big problem.")

"Fatalist" (e.g., "The future is too uncertain for a person to make serious plans.", "It feels pointless for me to take climate action if no one else does.")

"Hierarchist" (e.g., "I am more strict than most people about what is right and wrong.", "I support compulsory National Military Service.")

In addition, two statements assessed an "Indifferent" stance toward climate change (e.g., "The severity of climate change is exaggerated.", "Climate change is distant in space and time (it won't affect me personally)."). Respondents rated their agreement with each statement on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Higher scores on a given worldview category indicate stronger alignment with that perspective. (For analysis, items were grouped by their intended category; for example, we averaged the two "Indifferent" items to create an indifference score.)

Motivation for Adaptation: We assessed motivation to engage in future climate adaptation actions via nine items. Each item described a potential reason that might motivate the respondent to take adaptation measures, and respondents rated how much each factor motivates them on a 5-point Likert scale (1 = not at all motivating, 5 = very much motivating). The motivational factors were derived from Brink and Wamsler (2019a, 2019b) and covered:

Economic incentives (e.g., "I get financial benefits if I take action, e.g., tax deductions.", and a related low-cost motive "The action has low or no cost."),

Social motives (e.g., "I am encouraged by family members, friends or neighbors to take action.", and altruistic reasons like "The action can reduce the risk of other community members who are more at risk." and "I have a good conscience knowing I am doing the 'right' thing."),

Ecological motives (e.g., "The action contributes to a green and thriving local environment." and "The action also contributes to mitigating greenhouse gas emissions."), and.

Other/support motives (e.g., "The action requires no or few skills or know-how.", and "I am encouraged by the municipality to take action.").

We computed mean scores for each category as well as an overall adaptation motivation score (average of all nine items) to use in analysis.

Adaptation Actions: The survey asked about actual climate adaptation actions that respondents had already taken in their household or daily life. We presented a checklist of common adaptive actions for climate-related risk reduction, drawn from Brink and Wamsler (2019a, 2019b) and aligned with everyday household measures. Respondents indicated which of these actions (if any) they had undertaken. The actions can be grouped into four types:

Technical actions – e.g., "Acquiring pumps and/or sandbags to use in case of flooding", "Adapting the property to withstand heavy rain/strong winds better (e.g., improved drainage, anchor roof tiles)", "Removing or trimming trees that could fall on the property during a storm."

Social actions – e.g., "Looking after elderly relatives/neighbors during a heat wave.", "Warning neighbors when a storm or other weather event is coming or has occurred."

Institutional actions – e.g., "Trying to influence the property owner/housing cooperative to take measures", "Revising home insurance to ensure coverage of weather-related events."

Organizational actions – e.g., "Preparing for power outages (keeping candles, a battery-powered radio, etc.)", "Bringing in loose possessions before a storm.", "Moving to an area that is less at risk from extreme weather events."

We tallied the number of actions in each category that a respondent had done and also computed an overall adaptation action index (the total count of all actions checked). These measures allowed us to examine not just whether someone has taken any measures but also differences in the types of adaptive strategies employed.

2.2. Statistical analysis

All quantitative analyses were conducted using SPSS v26.0 and AMOS v29.0. Prior to hypothesis testing, we examined the data distribution and internal consistency of the scales. Although some variables showed deviations from normality (according to Shapiro–Wilk tests and skewness/kurtosis values), the sample size was sufficiently large ($N > 1000$) that parametric tests remained robust (Lumley et al., 2002). We therefore proceeded with parametric analyses. Reliability of multi-item scales was assessed with Cronbach's alpha (α) and McDonald's omega (ω). Table 1 presents Cronbach's α and ω for each scale and subscale. For instance, the overall adaptation action index (all action items) had $\alpha = 0.913$, indicating high reliability. The four specific action subscales (technical, social, institutional, organizational actions) had α values between 0.699 and 0.802, suggesting acceptable internal consistency for these categories. The worldview battery (10 items spanning multiple dimensions) yielded an aggregate $\alpha \approx 0.71$; this moderate value reflects the intentional diversity of the worldview items. The nine adaptation motivation items were highly internally consistent as a set ($\alpha = 0.907$), and each motivation subscale also showed strong reliability.

We then computed descriptive statistics for all variables and bivariate correlations between worldviews, climate concerns, adaptation motivation, hazard experience, and adaptation actions. Group differences by gender and hazard experience (recent and lifetime) were examined using independent-samples *t*-tests.

Before estimating the structural equation model (SEM), we evaluated the measurement models for the multi-item constructs using confirmatory factor analysis (CFA). Given the ordered categorical nature of most items, CFAs were estimated with a diagonally weighted least squares (DWLS) estimator with robust standard errors and a scaled, shifted chi-square test statistic. Model fit was assessed using χ^2, the comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square error of approximation (RMSEA; with 90% confidence interval and p-close), and the standardized root mean square residual (SRMR). Following common conventions, CFI/TLI ≥ 0.95 and SRMR ≤ 0.08 were taken as indicative of good fit, and RMSEA ≤ 0.06 as close fit, with values up to about 0.08 considered acceptable in applied work.

Table 1
Cronbach's α and McDonald's ω values of the subscales.

Subscales	Cronbach's α	McDonald's ω
Adaptation actions, overall	0.913	0.912
Technical actions	0.802	0.804
Social actions	0.728	0.735
Institutional actions	0.699	0.701
Organizational actions	0.707	0.732
Worldviews	0.713	0.720
Motivation	0.907	0.907

CFAs were conducted for: adaptation action subscales (technical, social, institutional, organizational), adaptation motivation subscales (economic, social, ecological, other), and.

worldview dimensions (indifferent and fatalist; communitarian and hierarchist, with climate concern used in a sensitivity model). Based on these analyses, we treated adaptation actions and worldviews as multidimensional constructs, which in practice could be parsimoniously represented by two broader latent factors each. For descriptive purposes, we retained all specific subscales; for SEM, we used the broader factors to keep the structural model estimable and consistent with theory.

Finally, we specified a structural equation model linking hazard experience, worldviews, adaptation motivation, climate concern, and adaptation actions. We treat SEM here as a theory-guided modeling of associations, not as proof of strict causal direction. The ordering (hazard experience → worldviews → motivation → actions, with climate concern as an additional correlate) reflects TPB and VBN assumptions as well as Brink and Wamsler (2019a, 2019b) conceptual framework, but we explicitly acknowledge that reverse and reciprocal influences are plausible.

3. Results

We first tested a CFA model for three specific adaptation action factors (technical, social, institutional), with organizational actions treated separately due to their distinct content. Technical actions were indicated by five items, social actions by two items, and institutional actions by three items. This model showed good overall fit, $\chi^2(32) = 108.68$, $p < .001$, CFI = 0.96, TLI = 0.94, RMSEA = 0.05, 90% CI [0.04, 0.06], p(close) = 0.57, SRMR = 0.10. All factor loadings were substantial and statistically significant (all ps < 0.001), with standardized loadings typically in the 0.70–0.90 range. A separate one-factor model for organizational actions (three items) was saturated (df = 0) and therefore showed perfect global fit by definition; all three indicators loaded significantly on the latent factor, with moderate to high loadings. The four action factors were strongly intercorrelated (r ≈ 0.40–0.58 for the specific factors, ps < 0.001), and each was very strongly correlated with the overall action index ($r = 0.68$–0.81, ps < 0.001).

A four-factor model was specified for adaptation motivation: economic, social, ecological, and other motivation. The model demonstrated excellent global fit, $\chi^2(21) = 117.52$, $p < .001$, CFI = 0.99, TLI = 0.98, RMSEA = 0.08, 90% CI [0.06, 0.09], p(close) < 0.001, SRMR = 0.02. All standardized factor loadings were large (typically ≥0.70) and highly significant, and residual variances were moderate, indicating good convergent validity. Latent correlations among the four motivation factors were substantial and positive (r ≈ 0.52–0.73, all ps < 0.001), suggesting that different motivational dimensions are strongly aligned while still distinguishable. In light of these results, we retained the four motivation subscales for descriptive and correlation analyses and used overall motivation as a latent factor in the SEM, with the four subscale means as indicators.

Next, we explicitly examined the multidimensional structure of worldview items rather than forcing a single latent "worldview" factor. First, a two-factor CFA model was tested for indifferent and fatalist worldviews, each measured by two items. This model showed very good fit, $\chi^2(1) = 6.77$, $p = .009$, CFI = 0.99, TLI = 0.96, RMSEA = 0.08, 90% CI [0.03, 0.14], p(close) = 0.14, SRMR = 0.02. All loadings were significant and moderate-to-high in magnitude, indicating that the two "disengaged" orientations are internally coherent and empirically separable. The latent correlation between indifferent and fatalist worldviews was positive but modest (≈ 0.18, p < .001), suggesting related but distinct forms of disengagement. Second, a CFA including communitarian and hierachalist worldview items (two indicators each), also indicated a well-fitting model, $\chi^2(4) = 22.60$, p < .001, CFI = 0.99, TLI = 0.97, RMSEA = 0.07, 90% CI [0.05, 0.11], p(close) = 0.08, SRMR = 0.03. Communitarian items loaded very strongly on a common factor, and hierarchist items formed a correlated factor. However, individualist worldview items, when added to the model, lowered model fit, so they were excluded from the final model. Taken together, these CFA results support at least two qualitatively different worldview domains: an engaged/collective responsibility orientation (primarily communitarian and hierarchist, with individualist values also positively aligned); and a disengaged orientation (fatalist and indifferent worldviews).

Climate concern was treated as a separate observed variable (single-item indicator) in the structural model, consistent with its conceptualisation as climate anxiety/worry rather than a worldview per se.

Discriminant validity (Fornell–Larcker). Discriminant validity was evaluated using the Fornell–Larcker criterion, which requires that the square root of the average variance extracted ($\sqrt{AVE}$) for each construct exceeds its correlations with other constructs. As shown in Table 2, this condition was satisfied for all constructs: Worldviews ($\sqrt{AVE} = 0.55$) exceeded its correlations with Motivation ($r = 0.34$) and Actions ($r = 0.28$); Motivation ($\sqrt{AVE} = 0.83$) exceeded its correlations with Worldviews (r = 0.34) and Actions ($r = 0.33$); and Actions ($\sqrt{AVE} = 0.67$) exceeded its correlations with Worldviews (r = 0.28) and Motivation (r = 0.33). These results support discriminant validity among the study constructs.

To test H1, which concerned gender differences, we conducted independent-samples *t*-tests comparing men and women on each key variable. We report group means, standard deviations, mean differences (M_diff) with standard errors, t statistics (with degrees of freedom), *p*-values, and effect sizes (Cohen's d). Table 3 shows the results for climate concern, each worldview dimension, each motivation category, and adaptation actions (overall and by type) for men vs. women. To summarize, women reported significantly higher climate change concern (M = 3.40, SD = 0.95) than men (M = 3.31, SD = 0.93), $t(1011) = -2.25$, $p = .025$, although the effect size was small (d = 0.17). No significant gender differences were found in any worldview scores (all $p > .1$); for example, men and women had nearly identical mean scores on Hierarchist and Communitarian worldviews. Likewise, there were no significant differences in the motivation scores by gender (all $p > .2$). However, we did find a significant difference in one behavioral category: men reported engaging in more technical adaptation actions than women $t(1011) = 3.37$, $p = .001$, d = 0.22. In contrast, for social, institutional, and organizational actions, men and women did not differ significantly (all p > .1). Therefore, H1 was only partially supported: the only robust gender differences were that women expressed greater concern about climate change, whereas men undertook slightly more technical protective measures. No other gender-based disparities were evident in this sample.

We next examined H2 and H3, which concerned differences based on climate hazard experience. We compared groups using t-tests for two scenarios: (a) those with vs. without any hazard experience in the last five years (H2), and (b) those who have ever experienced a hazard vs. those who never have (H3). Tables 4 and 5 summarize these comparisons.

For H2, 223 respondents (22% of the sample) reported at least one climate-related hazard experience in the past 5 years, while 790 (78%) reported none. The results showed clear differences consistent with H2. The group with recent hazard experience had higher climate change

Table 2
Fornell–Larcker Discriminant Validity Matrix (Latent Constructs).

Construct	1	2	3
1. Worldviews	**0.55**		
2. Motivation	0.34	**0.83**	
3. Actions	0.28	0.33	**0.67**

Note. Bold diagonal elements are $\sqrt{AVE}$ for each construct; off-diagonal elements are latent construct correlations from the measurement model. $\sqrt{AVE}$ values were computed from standardized loadings for the indicators in each construct.

Table 3
Descriptive Statistics and Gender Differences in Study Variables ($N = 1013$), groups of women ($n = 603$) and men ($n = 410$).

Variable	Overall M	Overall SD	Men M	Men SD	Women M	Women SD	$t(1011)$	p	Mean diff.	SE diff.	Cohen's d
Concern about climate	3.36	0.94	3.31	0.93	3.40	0.95	−2.25	0.025	−0.162	0.072	−0.173
Hierarchalist	3.05	0.84	3.06	0.87	3.04	0.81	0.79	0.433	0.050	0.064	0.060
Communitarian	3.42	0.83	3.40	0.82	3.44	0.84	−0.89	0.375	−0.058	0.065	−0.068
Individualist	3.87	0.76	3.86	0.75	3.81	0.77	0.74	0.460	0.044	0.059	0.057
Fatalist	3.25	0.90	3.23	0.86	3.27	0.92	−0.76	0.449	−0.054	0.072	−0.058
Indifferent	2.89	0.92	2.93	0.91	2.85	0.93	1.61	0.108	0.117	0.072	0.124
Technical actions	0.13	0.20	0.15	0.22	0.11	0.19	3.37	0.001	0.043	0.013	0.216
Social actions	0.23	0.35	0.23	0.35	0.23	0.35	0.25	0.801	0.006	0.023	0.016
Institutional actions	0.11	0.19	0.12	0.20	0.10	0.19	1.49	0.138	0.018	0.012	0.095
Organizational actions	0.23	0.27	0.23	0.28	0.23	0.27	−0.07	0.945	−0.001	0.018	−0.004
Overall actions	0.17	0.20	0.18	0.21	0.17	0.20	1.29	0.197	0.017	0.013	0.083
Economic motivation	4.07	0.93	4.09	0.89	4.06	0.97	0.11	0.910	0.008	0.072	0.009
Social motivation	3.91	0.84	3.90	0.82	3.92	0.85	−1.56	0.118	−0.103	0.066	−0.120
Ecological motivation	3.90	0.89	3.89	0.84	3.90	0.94	−0.29	0.773	−0.020	0.069	−0.022
Other motivation	3.83	0.92	3.85	0.91	3.82	0.93	0.25	0.800	0.018	0.071	0.020
Overall motivation	3.93	0.77	3.93	0.74	3.93	0.80	−0.40	0.687	−0.024	0.060	−0.031
Hazards (5 years)	0.29	0.63	0.29	0.65	0.29	0.60	−0.25	0.800	−0.012	0.049	−0.019
Hazards (lifetime)	0.36	0.71	0.37	0.75	0.34	0.68	0.76	0.450	0.043	0.056	0.058

Note. Mean difference = Men – Women. Positive values indicate higher scores among men. All variables are scored so that higher values indicate higher levels of the construct (e.g., greater concern, stronger endorsement of the worldview, higher motivation, more adaptation actions, or more hazard experiences).

Table 4
Descriptive Statistics and Differences by Hazard Experience in the Last Five Years in groups that experienced ($n = 223$) /not experienced ($n = 790$) hazards in the last five years.

Variable	No hazards (5 y) M	SD	Hazards (5 y) M	SD	$t(1011)$	p	Mean diff.	SE diff.	Cohen's d
Concern about climate	3.28	0.92	3.63	0.96	−4.25	< 0.001	−0.305	0.072	−0.328
Hierarchalist	3.00	0.82	3.22	0.87	−3.14	0.002	−0.205	0.065	−0.247
Communitarian	3.36	0.80	3.60	0.92	−3.31	< 0.001	−0.218	0.066	−0.263
Individualist	3.78	0.76	4.01	0.76	−3.34	< 0.001	−0.202	0.060	−0.265
Fatalist	3.34	0.85	2.94	0.97	5.84	< 0.001	0.403	0.069	0.456
Indifferent	2.95	0.89	2.68	1.01	3.62	< 0.001	0.261	0.072	0.284
Technical actions	0.07	0.15	0.30	0.26	−16.69	< 0.001	−0.226	0.014	0.082
Social actions	0.17	0.31	0.46	0.39	−11.40	< 0.001	−0.286	0.025	0.079
Institutional actions	0.08	0.16	0.22	0.25	−10.53	< 0.001	−0.146	0.014	0.078
Organizational actions	0.17	0.25	0.42	0.28	−12.89	< 0.001	−0.248	0.019	0.080
Overall actions	0.12	0.16	0.35	0.23	−16.93	< 0.001	−0.227	0.013	0.082
Economic motivation	4.01	0.96	4.28	0.82	−3.36	< 0.001	−0.245	0.073	−0.265
Social motivation	3.86	0.86	4.10	0.74	−3.64	< 0.001	−0.243	0.067	−0.290
Ecological motivation	3.89	0.91	3.93	0.84	−0.79	0.432	−0.057	0.073	−0.063
Other motivation	3.78	0.93	4.01	0.86	−2.98	0.003	−0.216	0.072	−0.234
Overall motivation	3.88	0.80	4.10	0.65	−3.47	< 0.001	−0.223	0.064	−0.288
Hazards (lifetime)	0.05	0.24	1.40	0.79	−41.77	< 0.001	−1.345	0.032	−3.168

Note. "No hazards in 5 years" = participants reporting no climate-related hazards during the last 5 years; "Hazards in 5 years" = at least one such hazard in the last 5 years. Mean difference = No hazards – Hazards. Negative values indicate higher scores among those who experienced hazards in the last 5 years.

Table 5
Descriptive Statistics and Differences by Lifetime Hazard Experience in groups that experienced (n = 259)/not experienced (n = 754) hazards ever in their lifetime.

Variable	No hazards (ever) M	SD	Hazards (ever) M	SD	$t(1011)$	p	Mean diff.	SE diff.	Cohen's d
Concern about climate	3.28	0.91	3.60	0.97	−3.77	< 0.001	−0.297	0.079	−0.320
Hierarchalist	3.01	0.81	3.16	0.90	−2.01	0.045	−0.140	0.070	−0.171
Communitarian	3.37	0.79	3.56	0.92	−3.03	0.003	−0.216	0.071	−0.257
Individualist	3.77	0.75	4.03	0.77	−3.68	< 0.001	−0.236	0.064	−0.312
Fatalist	3.34	0.86	3.00	0.95	5.04	< 0.001	0.390	0.077	0.428
Indifferent	2.95	0.89	2.71	0.99	3.61	< 0.001	0.286	0.079	0.306
Technical actions	0.07	0.14	0.28	0.26	−16.18	< 0.001	−0.209	0.013	−1.165
Social actions	0.17	0.31	0.42	0.39	−10.56	< 0.001	−0.254	0.024	−0.760
Institutional actions	0.08	0.16	0.21	0.24	−9.96	< 0.001	−0.132	0.013	−0.718
Organizational actions	0.17	0.24	0.41	0.27	−13.50	< 0.001	−0.245	0.018	−0.972
Overall actions	0.12	0.16	0.33	0.22	−16.42	< 0.001	−0.210	0.013	−1.182
Economic motivation	3.99	0.97	4.30	0.78	−4.33	< 0.001	−0.340	0.079	−0.367
Social motivation	3.86	0.87	4.06	0.73	−2.87	0.004	−0.206	0.072	−0.243
Ecological motivation	3.89	0.91	3.91	0.84	−1.48	0.140	−0.113	0.076	−0.125
Other motivation	3.78	0.93	3.97	0.88	−3.53	< 0.001	−0.274	0.077	−0.300
Overall motivation	3.87	0.81	4.09	0.65	−3.57	< 0.001	−0.233	0.065	−0.303

Note. "No hazards ever" = participants reporting no climate-related hazards at any point in their lifetime; "Hazards ever" = at least one such hazard. Mean difference = No hazards – Hazards. Negative values indicate higher scores among those who have experienced climate-related hazards in their lifetime.

concern (M = 3.51) than those with no recent experience (M = 3.31), t ≈ -3.0, $p = .003$. They also differed on several worldview dimensions:

those with recent experience scored significantly lower on Indifferent and Fatalist worldviews (meaning they were less likely to downplay climate change or feel helpless) and higher on Hierarchist, Communitarian, and Individualist worldviews (all differences $p < .05$). For example, the mean indifference score was about 0.3 points lower among the experienced group, indicating a more engaged mindset. In terms of motivation, the hazard-experienced group reported significantly greater adaptation motivation overall, especially on social and economic motivational factors (e.g. feeling more driven by community protection or potential incentives; $p < .01$ for those differences). Finally, those with recent hazard experience had taken more adaptation actions of all types: they scored higher on technical, social, institutional, and organizational actions than the no-experience group, with many differences significant at $p < .001$. In short, people who had faced a climate-related hazard in the last few years were more concerned, less indifferent/fatalistic, more motivated, and more active in adapting than those who had not.

However, ecological motivation was not significantly different across the groups, which proves a need for further examination.

For H3, 259 respondents (26%) experienced a climate-related hazard, while 754 (74%) had never experienced any. The patterns mirrored the H2 findings. The ever-experienced group showed higher concern about climate change ($p < .001$). They scored lower on Indifferent and Fatalist worldviews and higher on Hierarchist, Communitarian, and Individualist worldviews compared to the never-experienced group (all these differences were statistically significant, generally at $p < .01$). They also reported greater motivation to adapt (particularly social and overall motivation, $p < .01$). Correspondingly, those with any lifetime hazard experience had engaged in significantly more adaptation actions across all categories (all $p < .001$). One minor exception was that ecological motivation (being motivated by environmental benefits) did not differ much by experience; even those without hazard experience scored relatively high on caring about environmental co-benefits, suggesting that factor may be influenced by general environmental values more than personal disaster history. Table 5 displays the results on the scores of concerns/worries about climate change, worldviews, actions, and motivation in groups of those who experienced no hazards ever in their lifetime and those who experienced them.

Overall, the evidence strongly supports H2 and H3: personal experience with climate-related hazards, whether recent or at any point, is associated with heightened concern, shifts in worldview (toward less disengagement), increased motivational readiness, and greater adaptive action.

To address H4 and H5, we performed Pearson correlation analysis among all the key variables. Table 5 presents the correlation matrix for the entire sample.

Regarding worldviews and adaptation actions, Communitarian worldview was positively associated with technical ($r = 0.10$, $p < .01$), social ($r = 0.10$, $p < .01$), institutional ($r = 0.16$, $p < .001$), and organizational actions ($r = 0.10$, $p < .01$), as well as with the overall adaptation action index ($r = 0.14$, $p < .001$). Individualist worldview was also positively related to all four action types (technical: $r = 0.14$, $p < .001$; social: $r = 0.11$, $p < .01$; institutional: $r = 0.16$, $p < .001$; organizational: $r = 0.12$, $p < .001$) and to overall actions ($r = 0.16$, $p < .001$). Hierarchalist worldview showed weaker and less consistent links with behaviour: it was positively associated with social ($r = 0.08$, $p < .05$), institutional ($r = 0.11$, $p < .001$), and overall actions ($r = 0.07$, $p < .05$), but was not significantly related to technical or organizational actions ($r = 0.06$ and $r = -0.03$, respectively, ns). By contrast, more disengaged worldviews were negatively related to adaptation. Fatalist worldview showed small negative correlations with social ($r = -0.08$, $p < .05$), organizational ($r = -0.11$, $p < .001$), and overall actions ($r = -0.10$, $p < .01$), while its associations with technical and institutional actions were non-significant ($r = -0.06$ and $r = -0.05$, respectively). Indifferent worldview was negatively associated with social ($r = -0.10$, $p < .01$), institutional ($r = -0.09$, $p < .01$), organizational ($r = -0.10$, $p < .01$), and overall actions ($r = -0.10$, $p < .01$), and was not significantly related to technical actions ($r = -0.02$, ns). Overall, more communitarian and individualist orientations were associated with slightly higher engagement in adaptation, whereas fatalist and indifferent worldviews tended to co-occur with lower adaptive behaviour.

Motivation and adaptation actions were also consistently and positively related. Economic motivation showed positive correlations with all action types (technical: $r = 0.19$; social: $r = 0.20$; institutional: $r = 0.12$; organizational: $r = 0.29$; all $p < .001$) and with overall actions ($r = 0.26$, $p < .001$). Social motivation was similarly associated with technical ($r = 0.24$, $p < .001$), social ($r = 0.21$, $p < .001$), institutional ($r = 0.15$, $p < .001$), organizational ($r = 0.28$, $p < .001$), and overall actions ($r = 0.28$, $p < .001$). Ecological motivation correlated positively, albeit somewhat more modestly, with technical ($r = 0.15$, $p < .001$), social ($r = 0.12$, $p < .001$), institutional ($r = 0.15$, $p < .001$), organizational ($r = 0.16$, $p < .001$), and overall actions ($r = 0.18$, $p < .001$). Other motivation also showed positive associations with technical ($r = 0.21$), social ($r = 0.18$), institutional ($r = 0.19$), organizational ($r = 0.25$), and overall actions ($r = 0.26$; all $p < .001$). The Overall motivation index was positively correlated with all adaptation action indices (technical: $r = 0.23$; social: $r = 0.22$; institutional: $r = 0.19$; organizational: $r = 0.29$; overall actions: $r = 0.30$; all $p < .001$).

The correlations between worldviews and motivation followed a similar pattern to those for actions. Communitarian worldview showed consistent positive associations with Economic ($r = 0.15$, $p < .001$), Social ($r = 0.26$, $p < .001$), Ecological ($r = 0.28$, $p < .001$), Other ($r = 0.30$, $p < .001$), and Overall motivation ($r = 0.28$, $p < .001$). Individualist worldview was also positively related to Economic ($r = 0.18$, $p < .001$), Social ($r = 0.12$, $p < .001$), Ecological ($r = 0.20$, $p < .001$), Other ($r = 0.14$, $p < .001$), and Overall motivation ($r = 0.18$, $p < .001$). Hierarchalist worldview had no significant correlations with any motivation subscale or Overall motivation (all rs between -0.01 and 0.05, ns). Fatalist worldview was weakly and negatively correlated with Economic ($r = -0.09$, $p < .01$) and Overall motivation ($r = -0.08$, $p < .05$), and non-significantly with Social, Ecological, and Other motivation (all $|r| \leq 0.09$, ns). Indifferent worldview showed small negative associations with Economic ($r = -0.08$, $p < .05$), Social ($r = -0.09$, $p < .01$), Ecological ($r = -0.16$, $p < .001$), Other ($r = -0.08$, $p < .05$), and Overall motivation ($r = -0.13$, $p < .001$). In sum, more communitarian and, to a lesser extent, individualist worldviews were linked to higher adaptation motivation, whereas indifferent (and to a lesser extent fatalist) orientations were associated with lower motivation.

Finally, climate change concern (worry) was strongly related to Communitarian worldview ($r = 0.57$, $p < .001$), and more modestly but significantly associated with Hierarchalist ($r = 0.22$, $p < .001$) and Individualist worldviews ($r = 0.18$, $p < .001$). It was weakly negatively correlated with Fatalist worldview ($r = -0.07$, $p < .05$) and moderately negatively related to Indifferent worldview ($r = -0.28$, $p < .001$), indicating that more indifferent individuals reported substantially lower concern. Climate concern showed small but consistent positive correlations with all four adaptation action indices (technical: $r = 0.12$; social: $r = 0.12$; institutional: $r = 0.18$; organizational: $r = 0.13$; overall actions: $r = 0.17$; all $p < .001$), suggesting that more concerned individuals tended to engage in somewhat more adaptive behaviour. Climate concern was also positively related to all motivation subscales (Economic: $r = 0.18$; Social: $r = 0.29$; Ecological: $r = 0.31$; Other: $r = 0.27$; all $p < .001$) and to Overall motivation ($r = 0.30$, $p < .001$). Together, these findings indicate that higher climate concern co-occurs with more communitarian (and, to a lesser extent, hierarchist and individualist) worldviews, lower indifference, stronger motivation, and slightly higher levels of adaptation action.

Taken together, the correlational evidence supports H4 and H5: hazard exposure is linked with greater concern and action, and worldview orientations are meaningfully related to both motivation and behaviour. Correlation analysis of the study variables is displayed in Table 6.

Furthermore, to test H4, a covariance-based structural equation

Table 6
Pearson correlations of the study variables in the overall sample ($N = 1013$).

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Hierarchalist	–														
2. Communitarian	0.27***	–													
3. Individualist	0.18***	0.31***	–												
4. Fatalist	0.03	−0.00	−0.04	–											
5. Indifferent	−0.00	−0.06	0.03	0.36***	–										
6. Technical actions	0.06	0.10**	0.14***	−0.06	−0.02	–									
7. Social actions	0.08*	0.10**	0.11**	−0.08*	−0.10**	0.46***	–								
8. Institutional actions	0.11***	0.16***	0.16***	−0.05	−0.09**	0.47***	0.42***	–							
9. Organizational actions	−0.03	0.10**	0.12***	−0.11***	−0.10**	0.58***	0.52***	0.40***	–						
10. Overall actions	0.07*	0.14***	0.16***	−0.10**	−0.10**	0.77***	0.83***	0.68***	0.81***	–					
11. Economic motivation	−0.01	0.15***	0.18***	−0.09**	−0.08*	0.19***	0.20***	0.12***	0.29***	0.26***	–				
12. Social motivation	0.03	0.26***	0.12***	−0.05	−0.09**	0.24***	0.21***	0.15***	0.28***	0.28***	0.61***	–			
13. Ecological motivation	0.01	0.28***	0.20***	−0.08*	−0.16***	0.15***	0.12***	0.15***	0.16***	0.18***	0.56***	0.73***	–		
14. Other motivation	0.05	0.30***	0.14***	0.01	−0.08*	0.21***	0.18***	0.19***	0.25***	0.26***	0.57***	0.70***	0.73***	–	
15. Overall motivation	0.02	0.28***	0.18***	−0.08*	−0.13***	0.23***	0.22***	0.19***	0.29***	0.30***	0.81***	0.89***	0.88***	0.88***	–
16. Climate concerns	0.22***	0.57***	0.18***	−0.07*	−0.28***	0.12***	0.12***	0.18***	0.13***	0.17***	0.18***	0.29***	0.31***	0.27***	0.30***

Note. *$p < .05$, **$p < .01$, ***$p < .001$.

modeling (SEM) was conducted to examine various aspects of the relationships between the hazards, climate change concerns, and actions. Standardized results of the model are presented in Fig. 1. Findings revealed that the model fit was good: $\chi2 = 42.103$; Df = 8; CFI = 0.976; TLI = 0.938; NFI = 0.971; RMSEA = 0.065 [0.046–0.085].

The estimates of the model of associations between hazards, climate concerns, and actions are displayed in Table 7.

The SEM findings revealed that although climate change concerns are positively associated with hazards and actions, the links between hazard experiences and actions are stronger than the links between concerns and actions.

Furthermore, to test H5, the SEM was conducted to analyze the associations between worldviews, motivations, and actions (Fig. 2). To examine the overall latent structure of the key constructs, we estimated a three-factor model in which Worldviews, Motivation, and Actions were each represented as latent variables. Worldviews were indicated by Hierarchalist and Communitarian worldviews; Motivation by ecological, social, other, and economic motivation; and Actions by social, institutional, and technical action indices. This analysis used the unweighted data ($N = 725$), and missing values were handled via listwise deletion.

The model was estimated using maximum likelihood with standard errors and no scaled test statistic. Global fit indices indicated good fit to the data: $\chi^2(30) = 122.00$, $p < .001$, SRMR = 0.06, RMSEA = 0.07, 90% CI [0.05, 0.08], p(close) = 0.018, CFI = 0.96, TLI = 0.95, NNFI = 0.95, NFI = 0.95, IFI = 0.96, RFI = 0.94, PNFI = 0.79. Although the chi-square test was significant (as expected with this sample size), the CFI/TLI values above 0.95, SRMR below 0.08, and RMSEA in the acceptable range indicate that the model provides an overall adequate representation of the data. Besides, all factor loadings were positive, substantial, and statistically significant (ps < 0.001). For the Worldviews factor, Hierarchalist worldview was fixed as the marker indicator ($\beta = 0.51$, 95% CI [0.45, 0.57]), and Communitarian worldview loaded at $\beta = 0.58$, 95% CI [0.51, 0.65]. This suggests that the latent Worldviews factor captured moderate variance in both indicators (approximately 26–33% of their variance), with Communitarian somewhat more strongly related than Hierarchalist. For the Motivation factor, ecological motivation served as the marker ($\beta = 0.85$, 95% CI [0.82, 0.87]), with social motivation ($\beta = 0.88$, 95% CI [0.86, 0.90]), other motivation ($\beta = 0.82$, 95% CI [0.80, 0.84]), and economic motivation ($\beta = 0.75$, 95% CI [0.72, 0.78]) all loading very strongly. These high standardized loadings indicate that the four motivation dimensions share a strong common core and justify the use of an overall latent Motivation factor. For the Actions factor, social actions were used as the marker indicator ($\beta = 0.69$, 95% CI [0.64, 0.73]), while institutional actions ($\beta = 0.64$, 95% CI [0.59, 0.69]) and technical actions ($\beta = 0.69$, 95% CI [0.65, 0.74]) also loaded strongly. Thus, the social, institutional, and technical action indices can be viewed as three facets of a common adaptation action construct, each with roughly half of its variance explained by the latent Actions factor. Residual (indicator-specific) variances were all statistically significant and in the moderate range (e.g., for the Actions indicators, residual βs ≈ 0.52–0.59), indicating that while the latent factors account for substantial shared variance, there is also meaningful unique variance at the indicator level.

At the latent level, the three factors were moderately and positively correlated. Worldviews correlated with Motivation at $\beta = 0.34$, 95% CI [0.23, 0.45], $p < .001$, and with Actions at $\beta = 0.28$, 95% CI [0.15, 0.40], $p < .001$. Motivation was also positively associated with Actions, $\beta = 0.33$, 95% CI [0.25, 0.42], $p < .001$. These coefficients indicate that more engaged worldviews tend to co-occur with higher adaptation motivation and more frequent adaptation actions, and that higher motivation is also linked to higher action, although the relationships are moderate rather than redundant. In sum, the SEM analysis revealed that Worldviews, Motivation, and Actions can be validly represented as latent constructs with strong indicators and good global fit, and that they are positively and moderately interrelated.

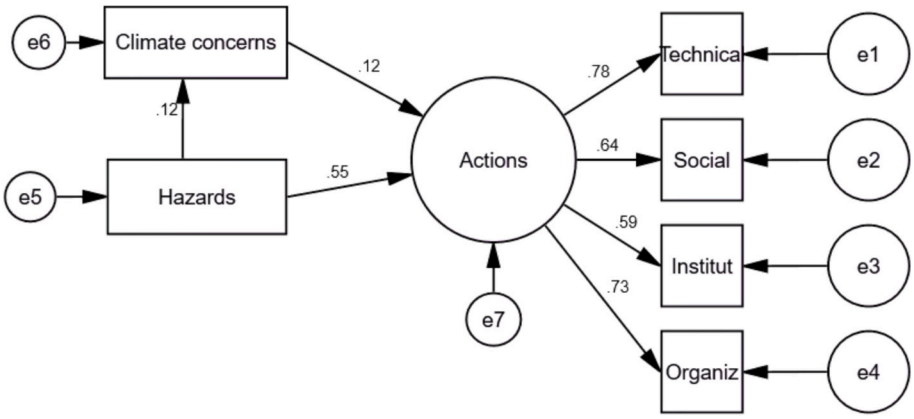
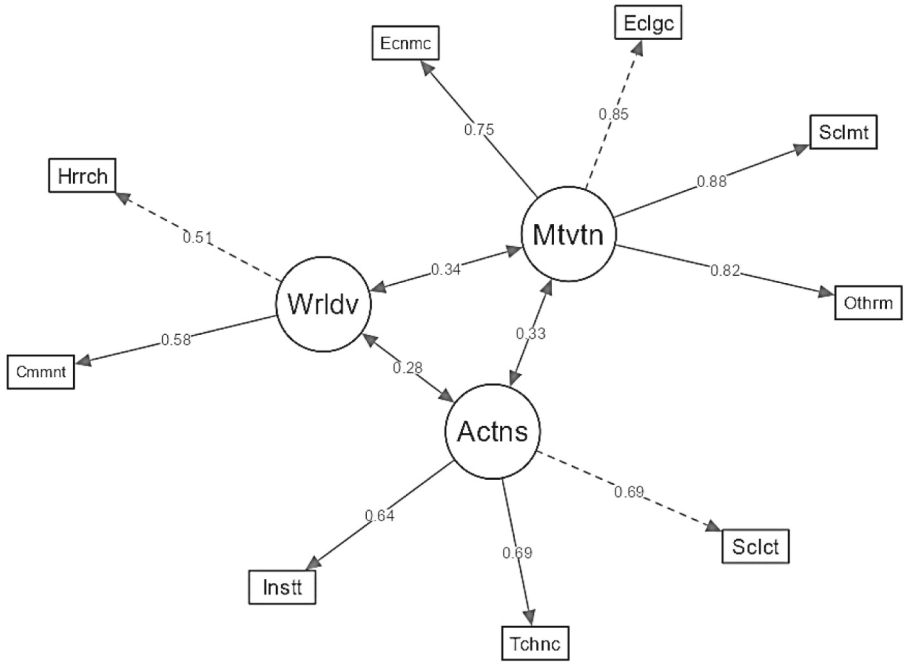


Fig. 1. Standardized results on the model of associations between hazards, climate concerns, and actions.

Table 7
Standardized and Unstandardized Regression Weights for the Structural Equation Model of associations between hazards, climate concerns, and actions.

Predictor	Outcome	B	SE (B)	C.R. (z)	p	β (standardized)
Hazards	Climate concerns	0.19	0.05	3.88	< 0.001	0.12
Hazards	Overall actions	0.14	0.01	16.69	< 0.001	0.56
Climate concerns	Overall actions	0.02	0.01	3.85	< 0.001	0.12
Overall actions	Technical actions	1.00	–	–	–	0.78
Overall actions	Social actions	1.44	0.08	18.53	< 0.001	0.64
Overall actions	Institutional actions	0.73	0.04	17.13	< 0.001	0.59
Overall actions	Organizational actions	1.28	0.06	20.76	< 0.001	0.73



Note. Wrldv – Worldviews (latent factor), Mtvtn – Adaptation motivation (latent factor), Actns – Adaptation actions (latent factor), Hrrch – Hierarchist worldview, Cmmnt – Communitarian worldview, Ecnmc – Economic motivation, Eclgc – Ecological motivation, Sclmt – Social motivation, Othrm – Other motivation, Instt – Institutional adaptation actions, Tchnc – Technical adaptation actions, Sclct – Social / collective adaptation actions.

Fig. 2. Standardized results on the model of associations between worldviews, motivation, and actions.
Note. Wrldv – Worldviews (latent factor), Mtvtn – Adaptation motivation (latent factor), Actns – Adaptation actions (latent factor), Hrrch – Hierarchist worldview, Cmmnt – Communitarian worldview, Ecnmc – Economic motivation, Eclgc – Ecological motivation, Sclmt – Social motivation, Othrm – Other motivation, Instt – Institutional adaptation actions, Tchnc – Technical adaptation actions, Sclct – Social / collective adaptation actions.

Finally, to test H6, which assumed that adaptation actions would be associated with hazard experiences, concern, worldviews, and motivation, we conducted SEM analysis; however, model fit indices indicated poor fit. Therefore, a multiple linear regression was conducted to examine whether worldviews, adaptation motivations, hazard experiences, and climate concern predicted overall adaptation actions. The analysis was run on the weighted data, with a sample size of $N = 694$.

The overall model was statistically significant, $F(13, 680) = 24.28$, $p < .001$, and explained about one-third of the variance in overall actions, $R = 0.56$, $R^2 = 0.32$, RMSE = 0.17. As shown in Table 8, economic motivation and recent hazard experience were the strongest unique predictors of overall adaptation actions. Higher economic motivation was associated with more adaptation actions, B = 0.030, SE = 0.010, $\beta = 0.13$, $t = 3.11$, $p = .002$. Likewise, having experienced climate-related hazards in the last five years was strongly and positively associated with overall actions, B = 0.581, SE = 0.156, $\beta = 0.30$, $t = 3.73$, $p < .001$. Lifetime hazard experience showed a positive but only marginal association with overall actions, B = 0.253, SE = 0.136, $\beta = 0.15$, $t = 1.86$, $p = .063$. Climate concern also showed a small positive trend toward significance, B = 0.018, SE = 0.009, $\beta = 0.08$, $t = 1.96$, $p = .051$. In contrast, none of the worldview variables (Hierarchalist, Communitarian, Individualist, Fatalist, Indifferent) were significant unique predictors in this full model when motivations and hazard experiences were included (all $|\beta| \leq 0.06$, all $p > .10$). Ecological and "other" motivation factors were also not significant in the fully adjusted model (both $p > .18$).

Taken together, the results of multiple regression analysis suggest that, when accounting for the overlap among all predictors, economic motivation and recent personal experience of climate-related hazards are the most robust correlates of overall adaptation actions, with worldviews and other motivations mainly exerting their effects indirectly or at the bivariate level.

4. Discussion

This study investigated factors related to citizen engagement in climate adaptation in Lithuania. Specifically, we examined how climate-related hazard experiences, worldviews, climate change concern, and different types of adaptation motivation relate to self-reported adaptation actions. Using a survey instrument originally developed and validated in Sweden (Brink and Wamsler, 2019a, 2019b), we replicated key elements in a Lithuanian context and explored similarities and differences across sociocultural settings. The findings contributed to the previous research in the field (Agliardi and Agliardi, 2021; Campiglio et al., 2023; De Witt et al., 2016; Formetta and Feyen, 2019; Harris et al., 2022; Jastrzębska, 2023; Lacroix and Gifford, 2018; Prokosch et al., 2022; Schmid-Petri and Bürger, 2022; Schwaab et al., 2022; Sharpe and Davison, 2022; Shi et al., 2015; Tan et al., 2022a, 2022b; Tolppanen et al., 2022a, 2022b) by confirming positive associations between hazard experience and adaptation actions and by clarifying how worldviews, concern, and multiple motivation dimensions are linked to adaptation actions. Additionally, the results demonstrated variations in citizens' worldviews, adaptation motivation, concerns about climate change, and adaptation actions based on gender or past experiences.

Table 8
Multiple regression predicting overall adaptation actions (weighted, $N = 694$).

Predictor	B	SE B	β	*t*	*p*
Intercept	−0.205	0.061	–	−3.39	< 0.001
Hierarchalist	−0.012	0.009	−0.048	−1.37	0.172
Communitarian	0.003	0.010	0.012	0.29	0.771
Individualist	0.015	0.010	0.055	1.57	0.117
Fatalist	0.004	0.008	0.018	0.52	0.604
Indifferent	−0.002	0.008	−0.009	−0.23	0.818
Economic motivation	0.030	0.010	0.135	3.11	0.002
Social motivation	0.023	0.014	0.094	1.68	0.094
Ecological motivation	−0.007	0.013	−0.030	−0.53	0.598
Other motivation	0.016	0.012	0.071	1.33	0.184
Lifetime hazard experience	0.253	0.136	0.149	1.86	0.063
Hazard experience last 5 years	0.581	0.156	0.298	3.73	< 0.001
Climate concern	0.018	0.009	0.082	1.96	0.051

The measurement models confirmed that the constructs of adaptation actions, motivation, and worldviews are not unidimensional. Adaptation actions clearly differentiated into technical, social, institutional, and organizational types that nevertheless formed a coherent latent action factor. Motivation was categorized into economic, social, ecological, and other motivations but could be summarized by an overall motivation factor. Worldviews classified into two qualitatively different domains: an engaged/collective responsibility orientation (primarily hierarchalist and communitarian) and a disengaged orientation (fatalist and indifferent).

This study also intended to identify some gender differences in climate change concerns, motivation types, worldviews, and adaptation actions, as earlier research has highlighted variations in motivational factors based on gender, with men participants showing a more significant influence of economic values and women participants demonstrating a stronger motivation driven by social values, particularly those aligned with "communitarian" worldviews (Brink and Wamsler, 2019a, 2019b). The findings revealed that women scored significantly higher than men in concern/worry about climate change, and men scored significantly higher on technical actions. However, no other significant differences between the groups were found. These results differ somewhat from previous findings (Brink and Wamsler, 2019a, 2019b), and might reflect the sociocultural specifics of the topic, indicating the necessity for additional research across different contexts. The findings suggest that gendered patterns of climate engagement may be context-dependent and shaped by country-specific social, economic, and housing conditions.

Another focus of this study was the role of hazard experience. Consistent with the hypotheses, respondents who had experienced climate-related hazards, whether in the last five years or at any point in their lifetime, reported: higher climate change concern, lower indifference and fatalism, higher hierarchalist, communitarian, and individualist worldviews, higher social and economic motivation (and higher overall motivation), and more adaptation actions across all types. These patterns align with prior work showing that direct experience of extreme events can heighten risk perception and concern (Diniz et al., 2018) and is associated with greater engagement in protective or pro-environmental actions (Brink and Wamsler, 2019a, 2019b; Brügger et al., 2016; Diniz et al., 2018). At the same time, ecological motivation did not differ significantly by hazard experience, suggesting that caring about environmental benefits may be anchored in broader value orientations (e.g., biospheric values) rather than personal disaster history (Ajdukovic et al., 2019; Whitley et al., 2018).

The results of this study also show that climate concern is positively linked to hazard experience and (modestly) to adaptation actions, in line with the idea that concern or climate-related anxiety can motivate engagement, particularly when accompanied by perceived efficacy (Pihkala, 2020; Lutz et al., 2023; Lutz, Zelenski, et al., 2023). However, recent longitudinal research suggests that the relationship between distress and pro-environmental behaviour can be bidirectional. Veijonaho et al. (2025), for example, found that adolescents who engaged in more pro-environmental behaviour at one time point reported higher climate distress later, while high distress did not consistently predict later behaviour. This indicates that acting on climate concerns can also amplify awareness of risks.

The observed pattern in our data, that people with hazard experience are more concerned and more active, fits with the idea that lived experience can be an important context or amplifier for concern and engagement. Yet, causality cannot be inferred from these cross-sectional data and reverse/reciprocal effects remain plausible.

The correlational analyses revealed coherent relationships between worldviews, motivation, and actions. More engaged worldviews

(especially communitarian and individualist) were associated with higher motivation across all dimensions and somewhat higher adaptation actions, whereas more disengaged worldviews (fatalist and indifferent) were associated with lower motivation and fewer actions. This is consistent with previous research showing that cultural worldviews and belief systems shape environmental responsibility and climate-related behaviour (Brink and Wamsler, 2019a, 2019b; Dake, 1992; Ivashkiv et al., 2020; Kapeller and Jäger, 2020; Lacroix and Gifford, 2018; Regmi et al., 2020; Sawatzky et al., 2021; Xu et al., 2022; Yang et al., 2022).

Motivation was systematically and positively related to adaptation actions: economic, social, ecological, and "other" motivation all showed small-to-moderate correlations with the different action types, and the overall motivation index correlated most strongly with overall action. This aligns with previous research on motivational drivers of adaptation (Brink and Wamsler, 2019a, 2019b; Chen, 2019; da Rosa, 2022; Hagen et al., 2023; A. M. van Valkengoed et al., 2024).

However, when we moved from bivariate correlations to a multivariate regression model including all worldviews, motivations, hazard experiences, and climate concern simultaneously, only economic motivation and recent hazard experience remained robust unique predictors of overall adaptation actions. Worldviews were no longer significant once motivation and experience were considered, and social and ecological motivation also lost their unique predictive power. This suggests that part of the role of worldviews may operate indirectly, through motivational pathways and perceived relevance of adaptation.

Previous research showed that worldviews and political/ideological identities often shape how people interpret and remember hazard experiences, rather than hazard experience operating as a simple exogenous cause of risk perception or behaviour. Ai et al. (2024), for instance, found that the effect of extreme weather experience on climate risk perception in Australia was largely contingent on political identity and causal beliefs about climate change. Experience increased risk perception mainly among those without strong partisan affiliations, and its influence operated largely through beliefs about anthropogenic causation. Our findings that more engaged worldviews co-occur with higher concern and action, but are not strong unique predictors once motivation and experience are entered are consistent with the idea that worldviews form part of a broader interpretive framework.

From a methodological perspective, we estimated CFAs for the action, motivation, and worldview items, showing that: multi-item constructs (actions, motivations, disengaged worldviews) display good internal coherence and fit, and worldviews and actions are clearly multidimensional and cannot be reduced to a single homogeneous factor. We then used SEM in a restricted, theory-guided way to examine patterns of association rather than to make strong causal claims. The hazards–concern–actions model showed good fit, and the latent Actions factor was strongly associated with self-reported hazard experience and more modestly associated with climate concern. The worldviews–motivation–actions SEM showed that the three latent constructs can be validly represented and are moderately interrelated. However, a more complex SEM that attempted to simultaneously model hazards, concern, worldviews, motivation, and actions with directional paths had poor fit, so we did not interpret it further and instead used a simpler multiple regression approach.

In light of recent longitudinal evidence (Veijonaho et al., 2025) and research on worldview-filtered risk perception (Ai et al., 2024), we interpret our SEM paths as associational and heuristic, consistent with theoretical expectations but not as proof of a fixed causal sequence (experience → worldview → motivation → action). Our cross-sectional design cannot exclude reverse or reciprocal effects, for instance, that more motivated and engaged individuals both do more and remember or report hazards differently, or that prior engagement increases later concern. Thus, while our findings indicate that hazard experience and economic motivation are among the strongest correlates of adaptation actions in this sample, it would be misleading to describe experience as "the strongest driver" in a strict causal sense.

To sum up, three findings of this study stand out. First, recent hazard experience was the most robust correlate of taking household actions, which aligns with the idea that lived experience makes risk salient and may reduce psychological distance, though we emphasize that the design does not establish directionality. Experience could increase action, but action-oriented people may also be more attentive to hazards or more likely to live in exposed contexts. Second, climate concern was positively associated with action but weakly once experience and motivation were considered. This is not a failure of concern; it is a familiar behavioral pattern: concern may be widespread, but action depends on motivation, perceived feasibility, resources, and enabling conditions. The small coefficient suggests that interventions aimed solely at increasing concern may have limited behavioral yield without parallel efforts that increase efficacy, lower costs, and provide practical pathways. Third, motivation and worldviews mattered in a structured way. Worldviews were associated with actions largely through their links with motivation, which is consistent with some theoretical frameworks (Ajzen, 2020; Fornara et al., 2020; van Valkengoed and Steg, 2019).

4.1.1. Implications, limitations, and future directions

Overall, this study offers context-specific insights into how climate-related hazard experiences, worldviews, climate concern, and different motivational dimensions relate to adaptation actions in Lithuania. It also underscores the importance of carefully modeling the measurement structure of psychological constructs before drawing inferences from structural models.

At the same time, several limitations must be acknowledged. First, all data are self-reported and cross-sectional, which raises concerns about common-method variance, social desirability, and recall bias regarding hazard experiences. Second, the cross-sectional design limits our ability to determine temporal or causal ordering among experiences, worldviews, concern, motivation, and actions. As noted, longitudinal and experimental work shows that relationships among distress, beliefs, and behaviour can be bidirectional and context-dependent (Ai et al., 2024; Veijonaho et al., 2025). Third, while our CFAs supported the measurement models in the Lithuanian context, further work on cross-cultural measurement invariance would strengthen the comparability of results with the original Swedish study and other contexts.

Several substantive questions also remain open. For example, many technical adaptation actions are more feasible for homeowners, but we did not assess homeownership or dwelling type, which may constrain or enable particular behaviors. Future research should explicitly capture such structural constraints, as well as cumulative exposure histories (e.g., frequency and severity of hazards). Moreover, our models did not include additional potential confounders such as education, income, or urban vs. rural residence, which could be important for understanding both hazard exposure and adaptation opportunities. Including these variables in future SEMs or regression models would allow a clearer separation of psychological and structural influences.

However, these psychological and experiential levers should be understood as complementary to, not substitutes for, structural measures and enabling conditions. The literature on adaptation governance highlights that financial, institutional, and informational barriers remain substantial (Berrang-Ford et al., 2021; Stein et al., 2013; Wamsler et al., 2020; Wamsler et al., 2023), and our study did not capture these directly. Effective adaptation therefore requires integrating citizen-level engagement with systemic interventions in infrastructure, planning, and governance (Hagen et al., 2023; IPCC, 2022; Li et al., 2021; Reiter et al., 2022; Runhaar et al., 2018; Wamsler et al., 2023).

Future research should combine longitudinal designs, improved measurement of exposure and structural constraints, and experimental

or quasi-experimental interventions to better understand how experiences, worldviews, concern, and motivation interact over time to shape adaptation behaviour. This would also allow testing mediation models more rigorously (e.g., the extent to which hazard experience operates through changes in concern, worldviews, or efficacy beliefs), which is highly relevant for designing targeted interventions and adaptive governance involving local communities (Wamsler and Brink, 2018; Wamsler and Bristow, 2022).

To sum up, in Lithuania, individual adaptation actions are most strongly associated with recent hazard experience and stronger motivation, while concern alone shows a smaller association once other factors are considered. These results imply several practical directions:

1. Target "no-experience" citizens with locally grounded risk communication that increases salience without relying on fear alone, pair messages with actionable checklists and resources.
2. Lower practical barriers via incentives and municipal support (e.g., subsidies for household protection measures; guidance for low-cost actions).
3. Convert concern into capability by providing clear behavioral pathways (what to do, how to do it, where to get help), especially for technical measures.
4. Integrate levels of adaptation: household engagement should be designed as a complement to institutional adaptation (planning, infrastructure, warning systems), not as a substitute.

5. Conclusions

This study examined climate adaptation at the individual level in Lithuania, focusing on how self-reported climate-related hazard experiences, worldviews, climate concern, and different types of adaptation motivation relate to adaptation actions. Several key conclusions can be drawn from the findings, with the caveat that they are based on cross-sectional associations.

First, individuals with past climate-related hazard experiences, whether recent or over their lifetime, reported higher concern about climate change, stronger motivation to adapt, and more frequent adaptive actions than those without such experience.

Second, hazard experiences were associated with lower fatalistic and indifferent worldviews and higher hierarchalist, communitarian, and individualist worldviews, suggesting shifts away from disengagement among those who have faced hazards. These worldview patterns, together with higher motivation, were associated with more adaptation actions.

Third, gender differences were modest and context-specific: women reported higher climate concern, whereas men reported slightly more technical adaptation measures. We did not find consistent gender differences in worldviews or overall motivation, highlighting that gender effects in climate adaptation should not be assumed to generalise across settings and may depend on structural and cultural factors.

Fourth, both climate concern and motivation were positively associated with adaptation actions, but multivariate analyses indicated that economic motivation and recent hazard experience showed the strongest unique associations with action.

Finally, these findings highlight that individual level factors are important pieces of the adaptation puzzle, but they operate within broader structural, institutional, and cultural contexts that this study did not capture. Further longitudinal and cross-cultural research is needed to clarify causal pathways and to understand how sociocultural and geographical contexts shape the interplay between hazard experience, worldviews, motivation, and climate adaptation behaviors.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

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Data availability

Data will be made available on request.

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