

Harbingers of climate change: The role of extreme weather experiences in perceiving and acting against climate change



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1 Introduction

Background:

Extreme weather events such as floods will continue to become more frequent, because societies did not sufficiently reduce greenhouse gas emissions
→ Two floods in Germany in 2024: 6000 evacuated persons, six billion Euro damage and six persons died

Motivation:

Scientific information about the life-threatening risks of climate change (CC) did not bring about sufficient changes
→ Are experiences of extreme weather events, instead, a potential driver of climate risk perception and behavioural change?

Research Objectives:

1. Identify the psychological mechanisms linking extreme weather experience to climate risk perception and action.
2. Investigate weather direct or indirect extreme weather experience (also see part 3) exerts a stronger effect on climate risk perception and action

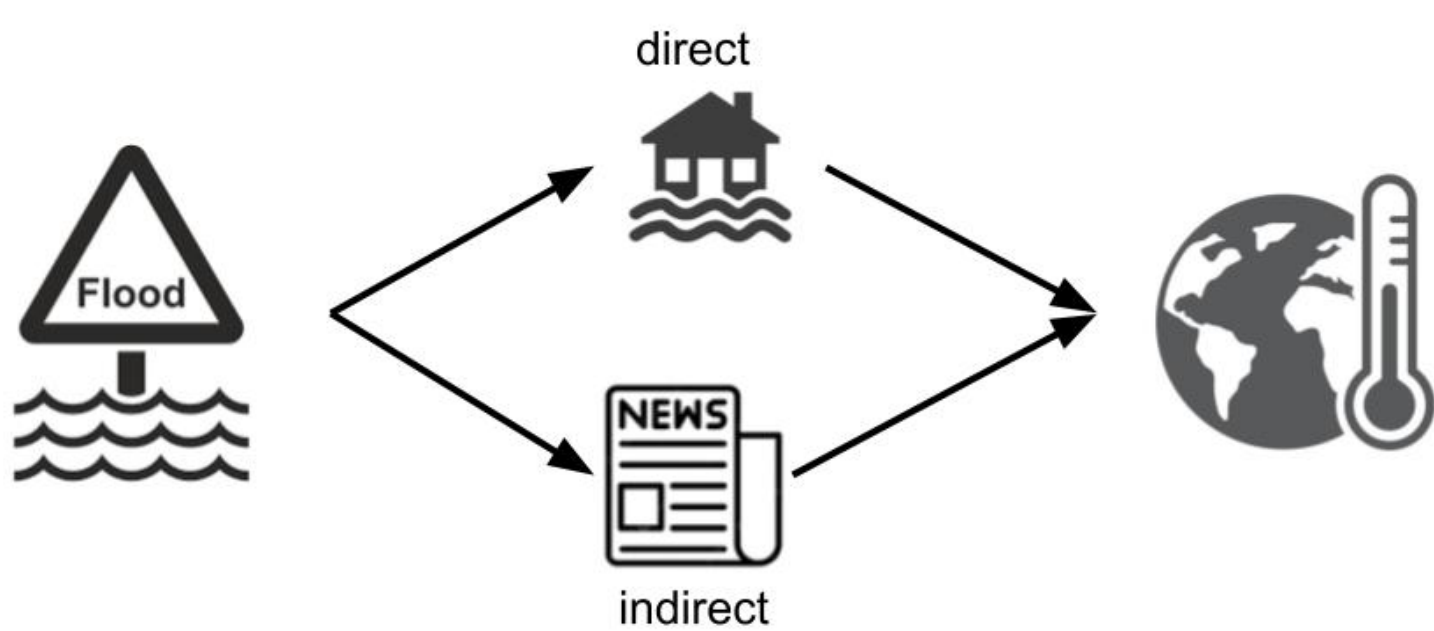


Figure 1: Direct and indirect extreme weather experience

2 Theorie

Mental processing mechanisms:

- Awareness of dependence on nature:** Perceived constant availability of natural goods reducing dependency awareness
→ floods illustrating nature's potential impact
→ transformation of dependency feelings into climate risk perception
- Affective path:** Emotional impact arising from subjectively significant risk experiences (retrospective emotions $\hat{=}$ paralyzing effects; prospective emotions $\hat{=}$ transformative effects)
→ feelings of fear or concern transform into motivation to act
- Cognitive path:** Increased risk relevance driving heightened information-seeking (compensating for information deficits)
→ quantity and stability of knowledge enhancing motivation to act

Psychological distance:

Perceived psychological distance from a phenomenon shapes action (Figure 2)
→ Low distance $\hat{=}$ situational responses
→ High distance $\hat{=}$ value-based responses
⇒ Indirect flooding experiences with bigger psychological distance have stronger effect on climate risk perception and action

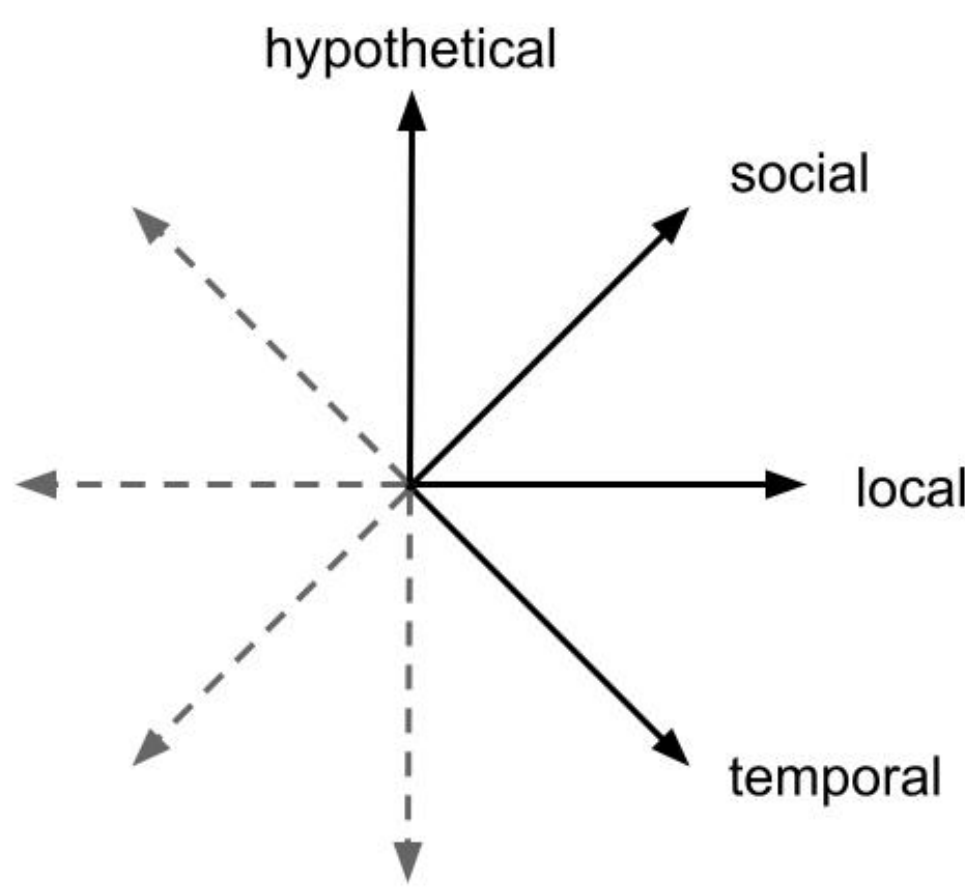


Figure 2: psychological distance

3 Data and Methods

Data:

Planetary health and action survey from November 2024
→ German quota sample by age, gender and federal state (N = 1,130)
→ 7.4% directly affected and 37.7% indirectly affected by flooding

Operationalisation:

A measurement model is used to capture the latent structure of the psychological concepts (see Table 1 for an overview). Direct and indirect experiences are distinguished as follows:

Direct experience: Personal exposure with flood impacts

Indirect experience: Media-based exposure without personal harm

Latent construct	R ²	Latent construct	R ²	Latent construct	R ²
Dependence on nature	0.14	Ecological consumption	0.39	Mobility behaviour	0.07
CC – Risk perception	0.38	Longevity consumption	0.06	Nutrition behaviour	0.16
Emotional affectedness	0.43	Frequency of information	0.20	Climate enthusiasm	0.60

Table 1: Explained variance (R²) of latent constructs

Method:

Structural Equation Modelling (SEM) to test simultaneous paths and mediating mechanisms (Figure 3)
→ Acceptable model fit: RMSEA = 0.066, SRMR = 0.086

4 Results

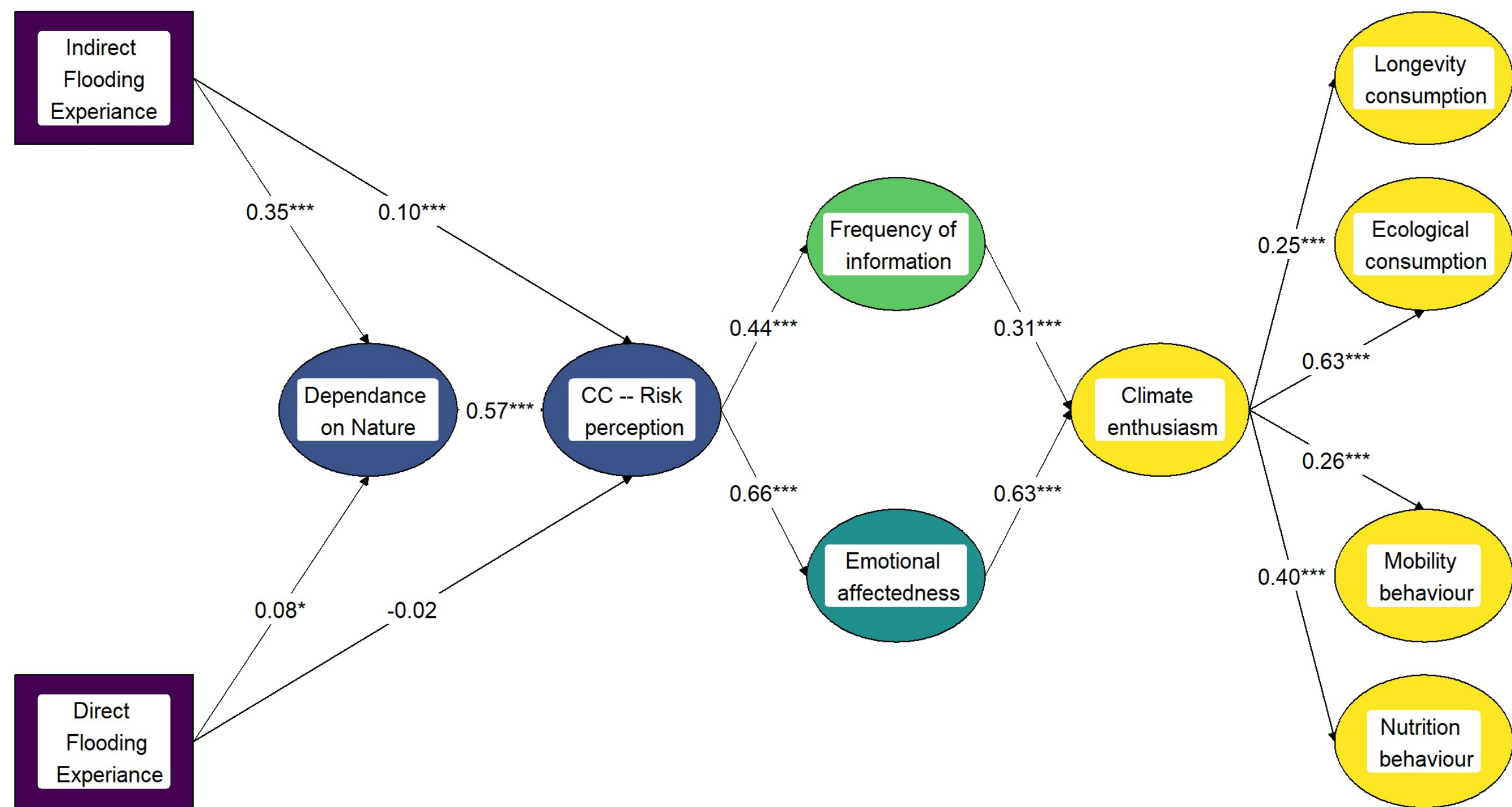


Figure 3: SEM Model of mental transformation of flooding experience

SEM (Figure 3):

- Awareness of dependence on nature:** Indirect exposure to flooding significantly increased perceived dependence on nature ($\beta = 0.38$), whereas direct exposure had only a weak effect ($\beta = 0.08$). Dependence on nature as major predictor of risk perception ($\beta = 0.57$), confirming its mediating role
- Affective path:** Strong evidence for the affective path: Risk perception with strong positive effect on emotional concern ($\beta = 0.66$). This again substantially increased motivation to engage with climate change ($\beta = 0.63$).
- Cognitive path:** Risk perception enhances information seeking ($\beta = 0.44$), which moderately increased motivation to engage with climate change ($\beta = 0.31$)

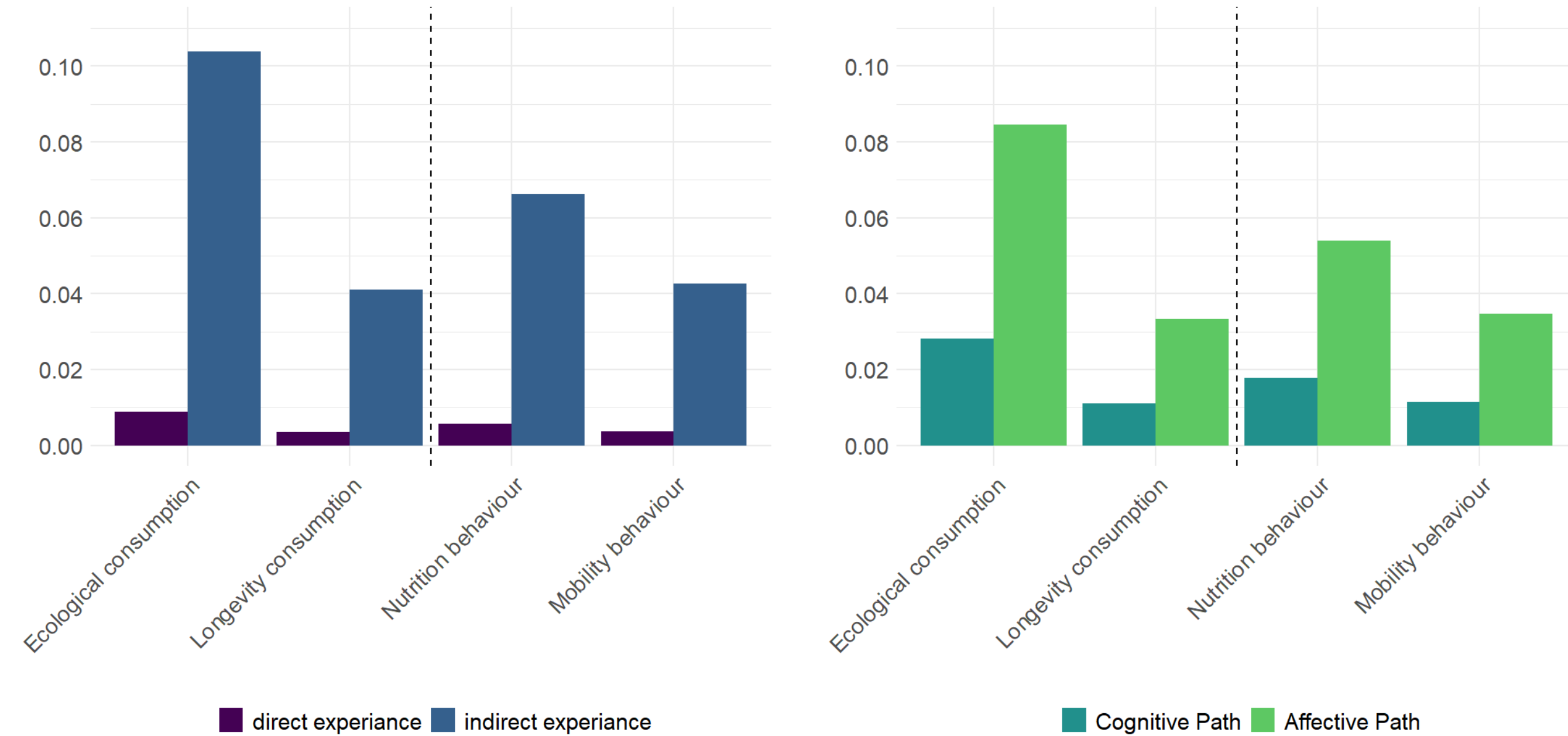


Figure 4: Direct vs. indirect experience

Figure 5: Affective vs. cognitive pathway

5 Conclusion

Takeaways:

1. Both affective and cognitive processing of flood experiences are important for behavioral activation
→ Affective path exerts three times stronger impact than the cognitive (Figure 5)
2. Media coverage plays a major role in linking natural disasters to climate change
→ Indirect flood experience has eight times stronger impact than direct (Figure 4)
→ Media framing facilitates the interpretation of flooding as symptom of climate change

Strengths:

1. Quasi-random exposure to direct flood experience as stimulus
2. Wide range of exact measures of relevant psychological variables to model the long pathway from exposure to reaction

Limitations:

1. Direct flooding exposure is (I) self reported and (II) infrequent
2. Limited causal interpretation, due to cross-sectional data

References

- Ajzen, I. (1991). 'The theory of planned behavior', *Organizational Behavior and Human Decision Processes* **50**(2), 179–211.
- Griffin, R. J., Dunwoody, S. & Neuwirth, K. (1999). 'Proposed Model of the Relationship of Risk Information Seeking and Processing to the Development of Preventive Behaviors', *Environmental Research* **80**(2), S230–S245.
- Jenny, M. A., Lehrer, L., Eitze, S., Sprengel, P., Korn, L., Shamsrizi, P., Geiger, M., Hellmann, L., Mai, L., Maur, K. & Betsch, C. (2022). 'Accelerating climate protection by behavioural insights: The planetary health action survey (PACE)', *The Lancet Planetary Health* **6**, S19.
- Lazarus, R. (1991). 'Progress on a Cognitive-Motivational-Relational Theory of Emotion', *The American psychologist* **46**, 819–84.
- Matthewman, S. (2015). Sociology and disasters, in S. Matthewman, ed., 'Disasters, Risks and Revelation', Palgrave Macmillan, Basingstoke, pp. 11–34.
- Spence, A., Poortinga, W., Butler, C. & Pidgeon, N. F. (2011). 'Perceptions of climate change and willingness to save energy related to flood experience', *Nature Climate Change* **1**(1), 46–49.