

Flood Impacts Observation - Montpellier

Using panel data to understand differences in individual recovery from flood impacts



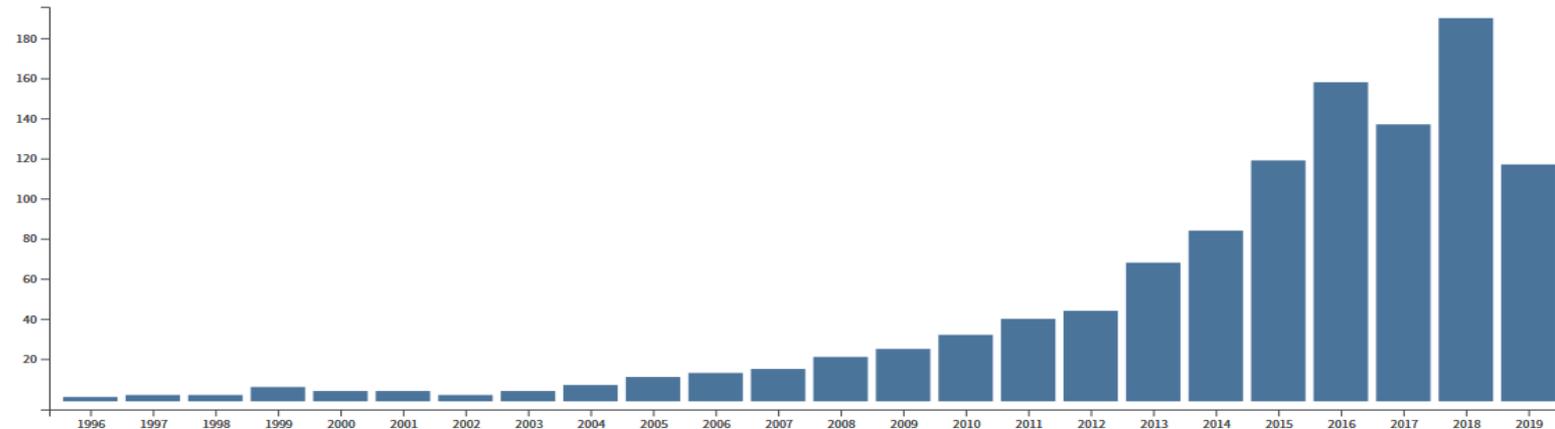
Philip Bubeck, Lisa Berghäuser, Paul Hudson, Annegret Thieken
University of Potsdam

Background

- Large number of citizens affected by flooding in Germany and Europe
- Citizens play increasingly important role in integrated flood risk management strategies
- Interest in citizens perceptions, attitudes, adaptation behavior and individual recovery

Total Publications

1.106 [Analyze](#)



Predominant focus on snap-shot data

Risk Analysis

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Perception and Communication of Flood Risks: A Systematic Review of Empirical Research

Wim Kellens  Teun Terpstra, Philippe De Maeyer

First published: 31 May 2012 | <https://doi.org/10.1111/j.1539-6924.2012.01844.x> | Cited by: 166

Risk Analysis

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A Review of Risk Perceptions and Other Factors that Influence Flood Mitigation Behavior

P. Bubeck  W. J. W. Botzen, J. C. J. H. Aerts

First published: 06 March 2012 | <https://doi.org/10.1111/j.1539-6924.2011.01783.x> | Cited by: 242



Science of The Total Environment

Volume 626, 1 June 2018, Pages 165-194



Review

The long-term physical and psychological health impacts of flooding: A systematic mapping

Shuang Zhong ^a, Lianping Yang ^b, Sam Toloo ^c, Zhe Wang ^d, Shilu Tong ^e, Xiaojie Sun ^g, David Crompton ^f, Gerard FitzGerald ^h , Cunrui Huang ^b 



Clinical Psychology Review

Volume 63, July 2018, Pages 41-55



Review

Trajectories of resilience and dysfunction following potential trauma: A review and statistical evaluation

Isaac R. Galatzer-Levy ^a , Sandy H. Huang ^b, George A. Bonanno ^b

Listen

Original Articles

The challenges of longitudinal surveys in the flood risk domain

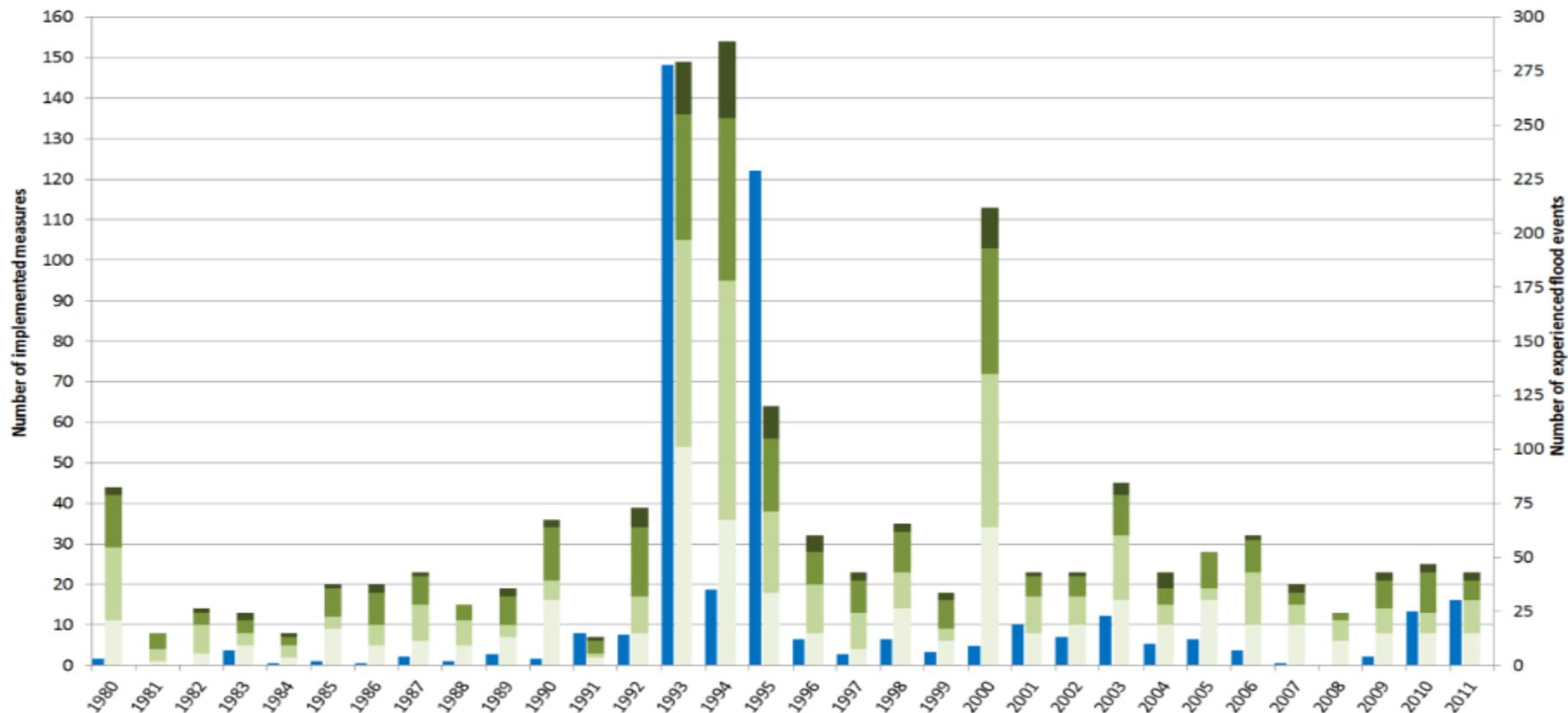
Paul Hudson  Annegret H. Thieken & Philip Bubeck

Received 15 Oct 2018, Accepted 22 Mar 2019, Published online: 09 Jun 2019

 Download citation | <https://doi.org/10.1080/13669877.2019.1617339>



Employment of adaptation measures over time



Source: Bubeck et al. (2012): NHESS. 12, 3507–3518.

Challenges of panel studies in the flood risk domain

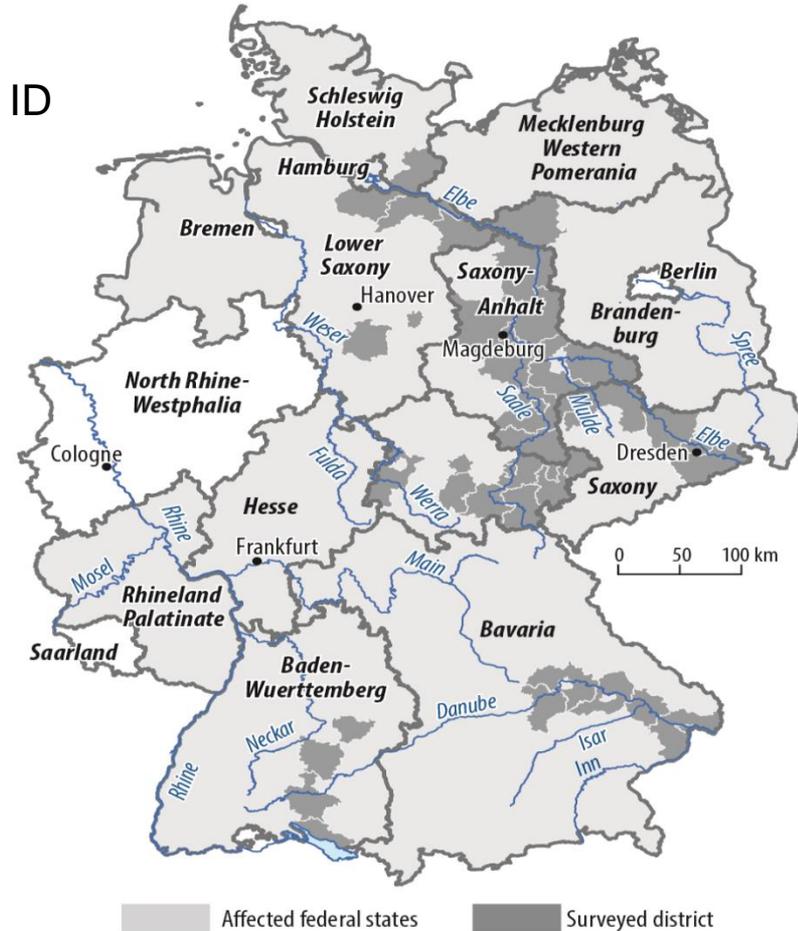
- Difficulty to motivate people for repeated surveys
 - Initial sample population small
 - Benefit for respondents rather unclear
 - Attrition and retention bias
 - Higher resources compared with cross-sectional studies
 - Takes longer to come up with results, policy recommendations and publications
 - Funding structure for research projects
- Needed to understand dynamics, feedbacks, causality

A longitudinal survey among flood affected residents in Germany

Wave	Time after event	n
1 	~ 9 months	1652
2 	~18 months	710
3 	~ 45 months	310

Unique ID

- Damage to building and contents
- Flood event characteristics
- Social and financial assistance
- Psychological factors
- Personality traits
- Socio-economic characteristics
- **Individual recovery**
- **Adaptation behavior**



The two big problems of panel data: who stays in & why?

Attrition bias

- People leave the survey....
- ... at random
 - Not a problem
- ... non-random
 - We have a problem
 - If certain people stay in then our statistics are not trustworthy

→ Little concern in our panel

Retention bias

- People leave the survey...
- ... but we need to keep people in the survey
 - Statistical efficiency
 - Length of time we can study temporal effect

→ Bigger concern in our panel

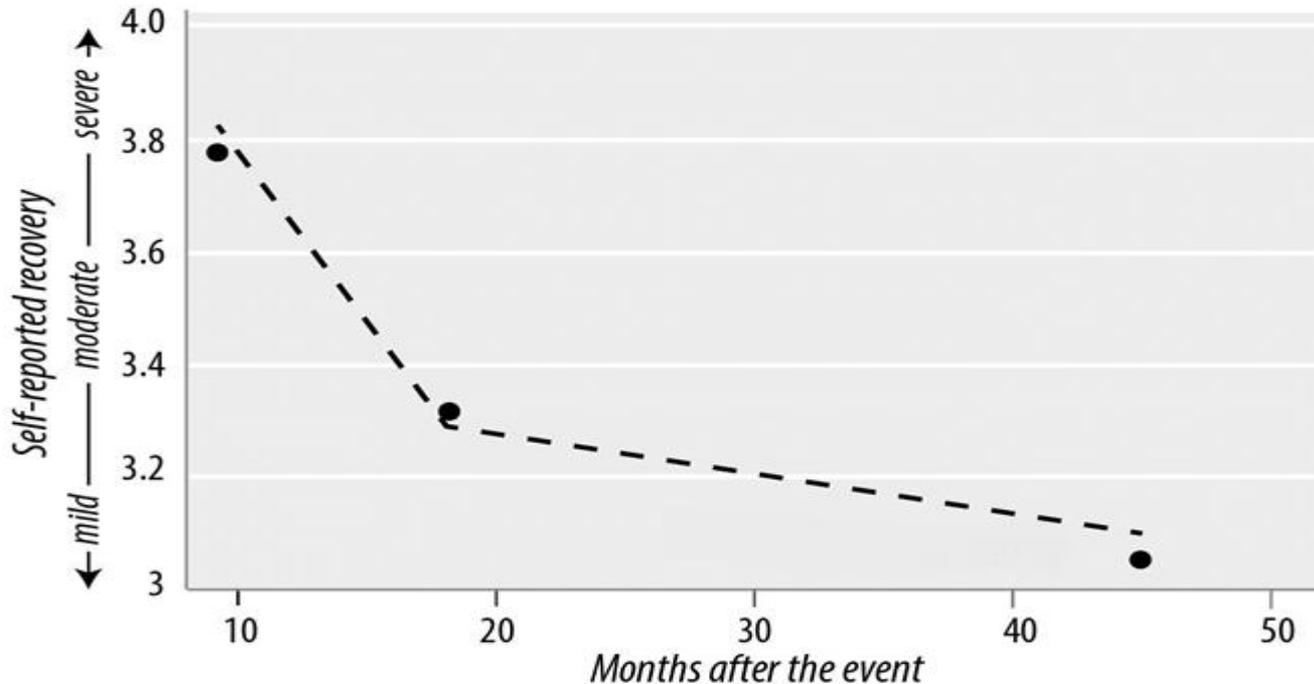
Dynamics in risk perceptions, adaptation behavior and recovery

Risk perceptions	
Perceived probability	↘
Perceived consequence	→
Attitudes	
Trust in federal government	→
Trust in community	→
Trust in insurance	→
Responsibility	→
Protection motivation	↘
Recovery	↗

Based on Friedman's ANOVA and pairwise comparisons

Dynamics of individual recovery from flooding

Variable (n)	Mean rank			Friedman's Test
	1 st wave	2 nd wave	3 rd wave	
Recovery				
Self-reported recovery (199)	2.22	1.96	1.82	$\chi^2 (2) = 22.260, p < 0.001$
Mental preoccupation (219)	2.45	2.02	1.53	$\chi^2 (2) = 111.162, p < 0.001$



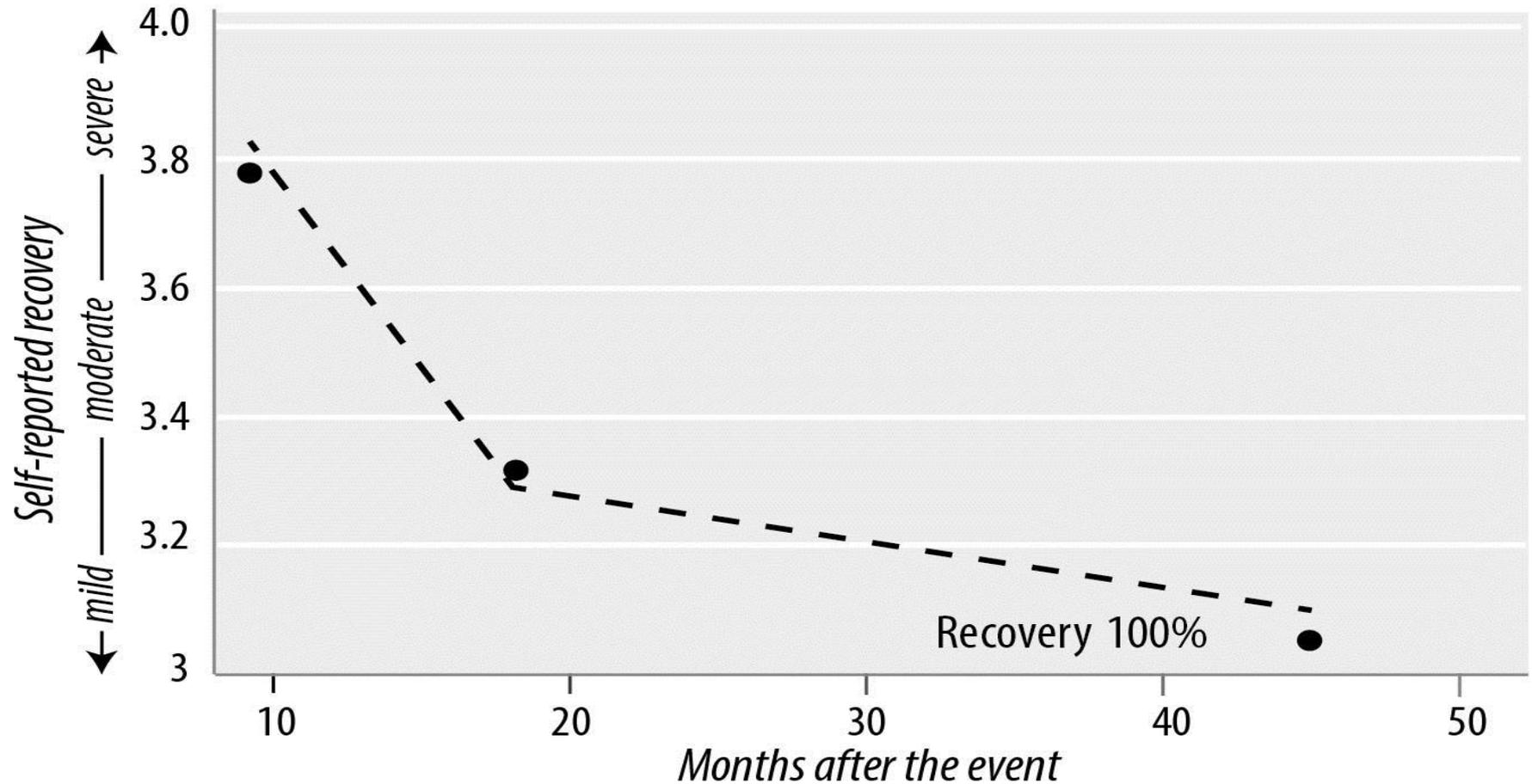
Individual recovery from potentially traumatic events

Figure 1: Prototypical response of individuals to a potentially traumatic event. Source: “Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events?” by B.A. Bonanno, 2004, *American Psychologist*, 59, p. 21. Copyright 2004 by the American Psychological Association. Adapted with permission.

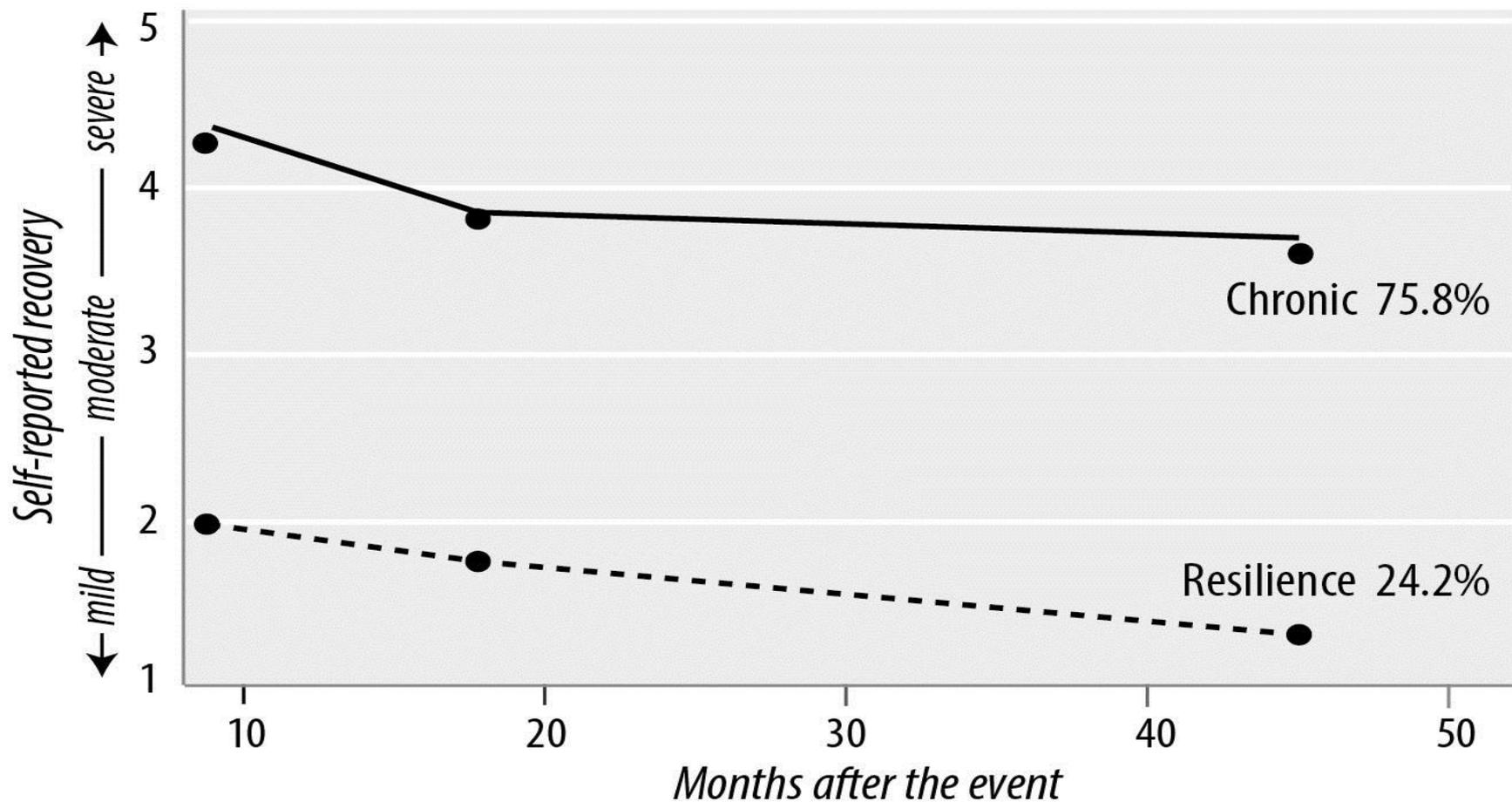
Latent class growth analysis (LCGA)

- Group-based modelling strategy (Nagin 1999)
- Specifically developed and used to analyze panel data
- Clusters individuals that follow similar pattern of change over time
- Heterogeneity in response trajectories is summarized by a finite set of unique polynomial functions, representing a homogeneous subgroup
- Number of subgroups defined by theory, empirical evidence and model fit indices

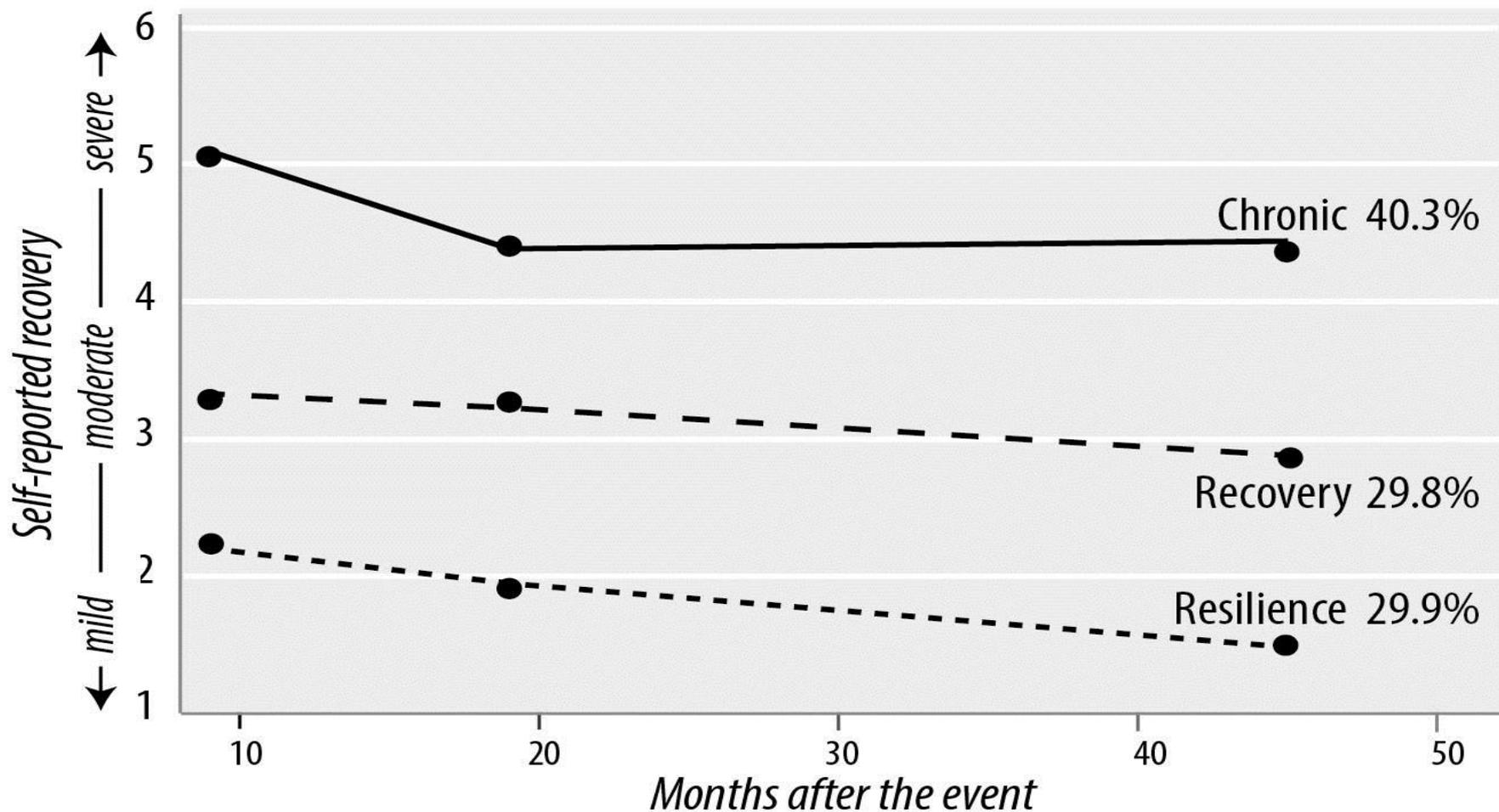
Results: Response trajectories



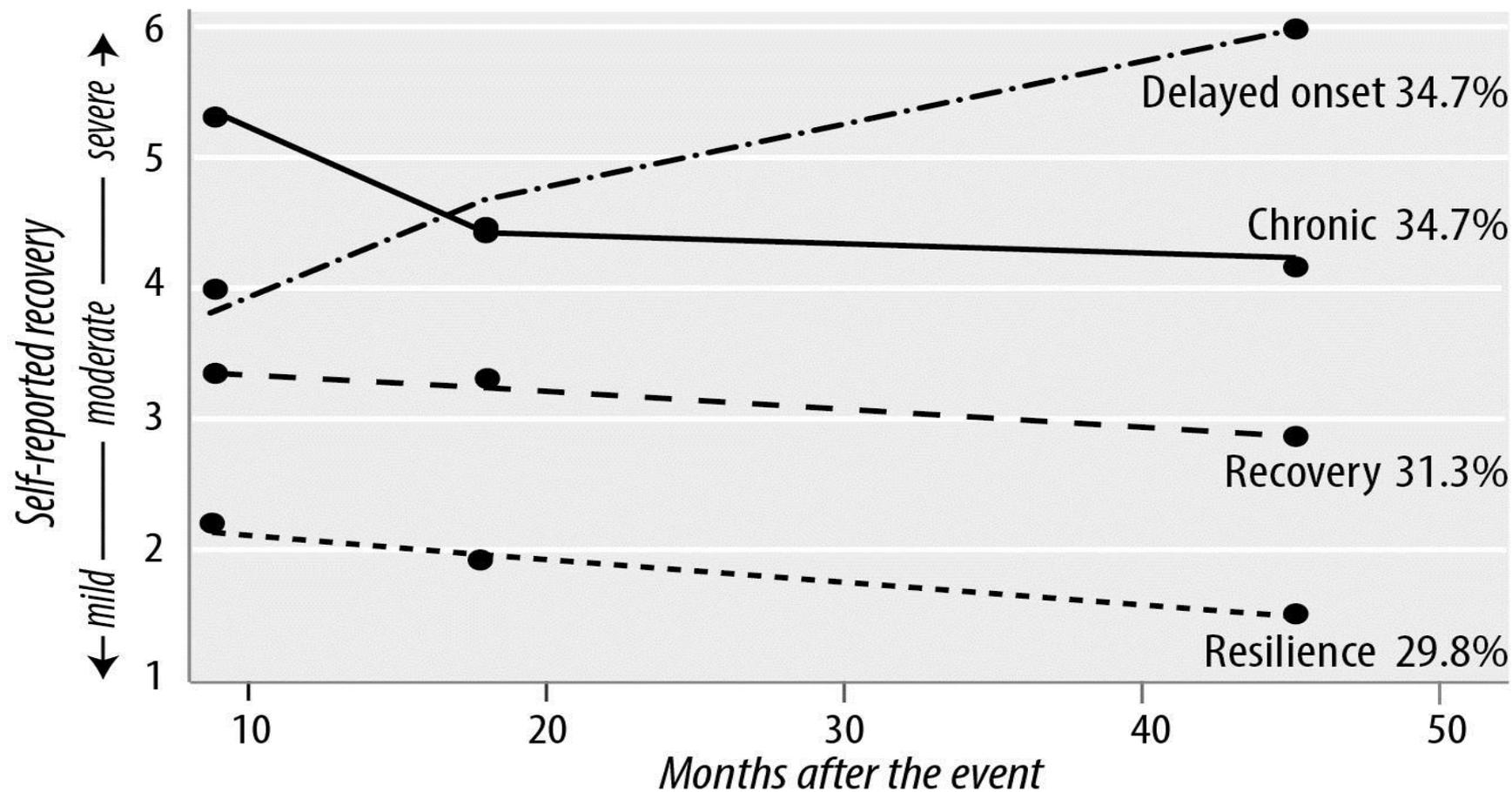
Results: Response trajectories



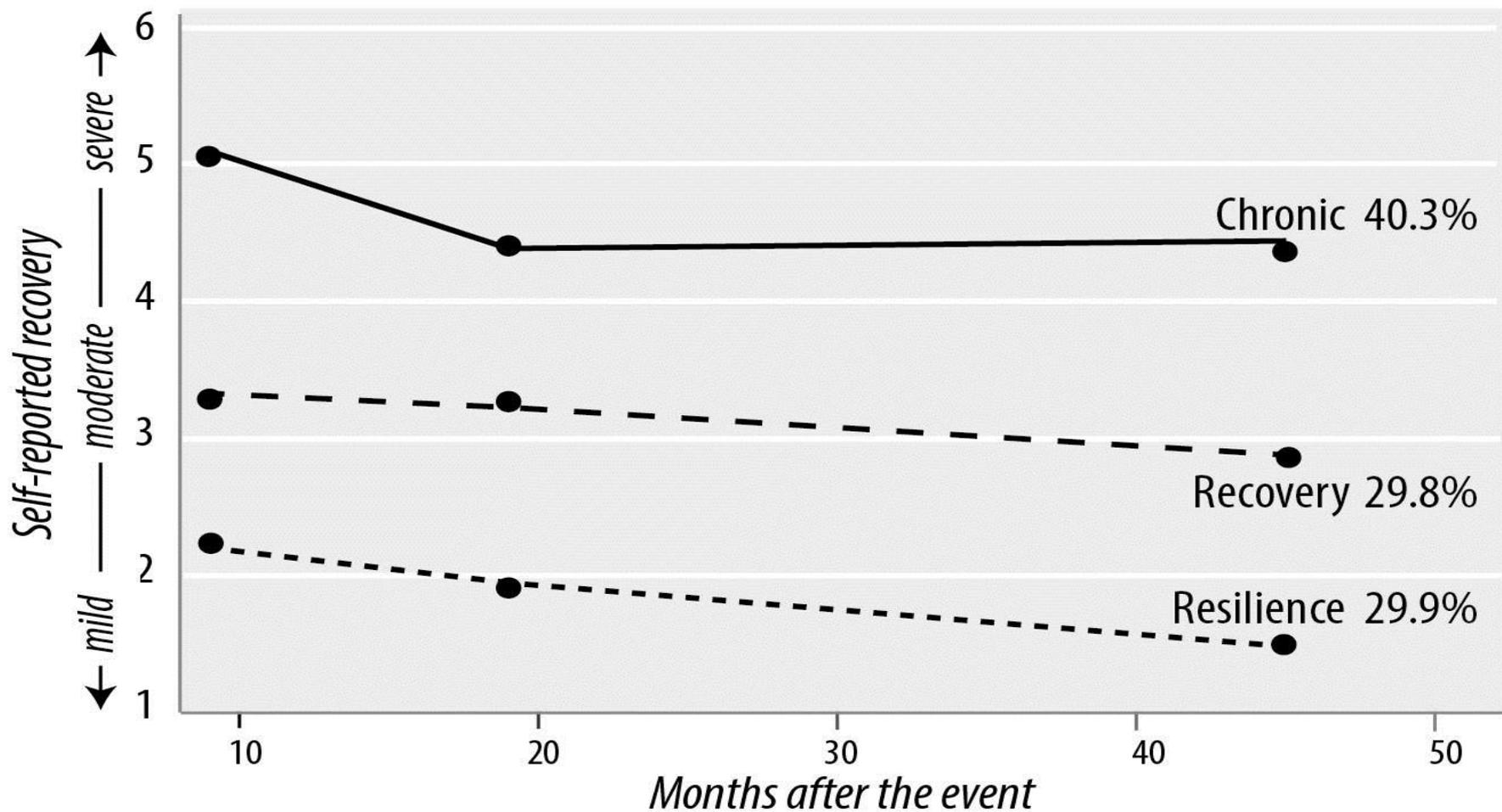
Results: Response trajectories



Results: response trajectories



Results: Response trajectories



Results: conditional model

Table 2: Predictive effects of risk and protective factors for group membership (best-fitting three trajectory group conditional model) with resilience as baseline group.

Risk/protective factor	Recovery parameter estimates	Chronic parameter estimates
Constant	-5.295 (-5.173)	-0.810 (6.606)
Gender	1.848 (0.976)*	1.930 (1.23)
Flow velocity	0.536 (0.377)	0.985 (0.503)*
Mental preocc.	1.939 0.500)***	2.998 (0.608)***
Income	-0.215 (0.322)*	-0.937 (0.436)**

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.0001$

Discussion and Conclusion

- Floods have a long-lasting impact on affected citizens (40 % chronic after 45 months)
 - Offers for long-term assistance necessary
 - Better focus on non-tangible impacts
- Recovery heterogeneous process that needs to be taken into account in recovery policies
 - Trajectories largely in line with literature
- More longitudinal studies needed to corroborate findings
 - Especially in terms of risk and protective factors
- Also adaptive behavior is dynamic process
 - Interpersonal differences?
 - Intentions ≠ behavior

Discussion and Conclusion

- Longitudinal studies needed to capture dynamics
- Insights needed for better risk assessments
- Integration into existing panels to overcome barriers for implementing panel surveys in the flood risk domain