When Risk Information Changes the Choice:

Experimental Evidence on Beach Preferences from a Two Wave Discrete Choice Panel

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Motivation: Invisible Risks in “Blue” Environments

- **Coastal bathing** offers major health and welfare benefits
- But there are low-probability, high-salience **microbial risks** (E. coli, enterococci, Vibrio, cyanobacteria)
  - Climate change is likely to increase pathogen occurrence and beach closures
- Behaviour and welfare depend on **what people believe**, not only actual risk
- Traditional mitigation and adaptation measures vs. **information campaigns**
  - Risk communication and knowledge – a relatively cheap “soft” adaptation tool

- **Does better risk information actually change preferences and implied welfare?**

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Case Study: Gdańsk Bay & Vistula Lagoon

- Polish Baltic coast: >745 bathing sites; 3196 tests; 6% officially rated unsatisfactory in 2023
  - 41 sites closed due to E. coli, 146 due to cyanobacteria blooms, 34 due to enterococci exceedances, no monitoring for Vibrio
- Intense tourism: ~1.5 million visitors annually; 25% of Poles visited the Baltic coast in last 12 months
  - Many beachgoers (≈69%) or their family members have direct water contact
- Media attention to closures, but information systems are fragmented and sometimes hard to interpret
- Ideal setting to ask: Can improved risk information shift site choices, preferences and welfare?
  - **Conceptual framework** incudes: habit formation, conditional learning from past experiences, cognitive learning (attention, perception, memory, active search, evaluation of new signals), social learning (family, friends, media, social networks influence), belief updating (pathogen risks info), vulnerability etc.

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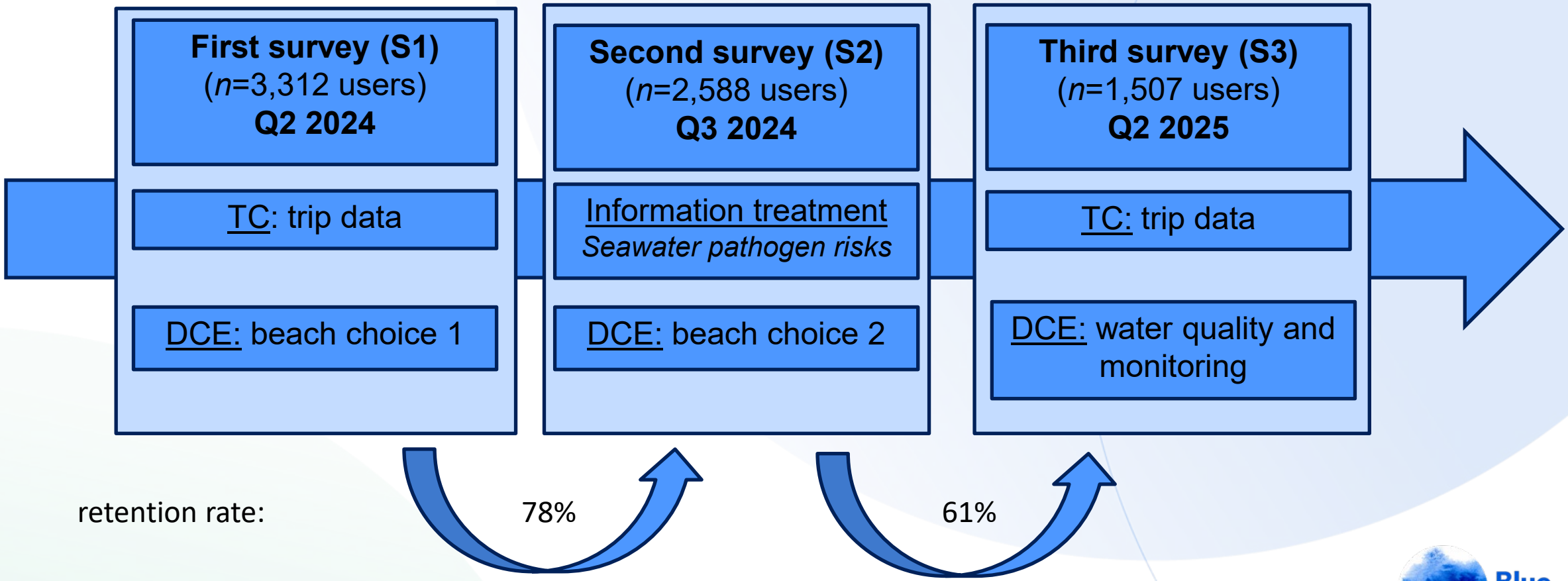
Study Design: Three-Wave Panel



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Information treatments and data

- Information treatments
  - T0 – Control: no extra information
  - T1 – Detailed pathogen-risk information – pathogens combined
  - T2 – Detailed pathogen-risk information – pathogens separately (more detailed)
  - Source, occurrences, infections, treatments, prevention guidance
- TC trip data – standard data regarding multi-day seaside trips and individual beach outings in the last 12 months (two recall periods)
  - Do information treatments affect: number of trips, distances traveled and travel costs, beach choices, cost sensitivity and consumer surplus?

    → See Kasia Skrzypek's presentation, back-to-back with this one

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Discretre Choice Experiment 1 – **Beach choice**

- Pivotal on the usual bathing trip last season: Which of these locations (bathing sites) would you go to for outdoor water recreation?
  - SQ + 1 or 2 alternatives
- Attributes:
  - Designated bathing site (yes/no)
  - Weather monitoring and information (temperature, wind, sea-state: yes/no)
  - Water quality monitoring and information
    - None, Once every 2 weeks, Once every 1 week, Once every 2 days, Every day
  - Distance (km), pivotal design
    - -50%, -25%, +0%, +25%, +50%, +100%
- 12 choice tasks x 2, with information treatments in-between

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Discretre Choice Experiment 2 – **Water quality and monitoring**

- Advisory referendum on a national programme, including mitigation or adaptation measures for bathing-water safety
  - SQ + 1 or 2 alternatives
- Attributes:
  - Water quality (infection risk per 1000 baths: 20/1000 (status quo), 10/1000, 5/1000, 2/1000)
  - Frequency of water-quality monitoring: (1×/month (status quo), 2×/month, 1×/week, 2×/week, every day)
  - Annual cost for the household (additional tax)
- 12 choice tasks

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Manipulation Checks – Knowledge & Awareness:

Treatment group:	T0 – Control (no extra info)	T1 – Detailed pathogen-risk (pathogens combined)	T2 – Detailed pathogen-risk (pathogens separately)
Objective knowledge[1] quiz scores	7.16 (3.06)	8.69*** (3.07)	
Objective knowledge – quiz scores	7.16 (3.06)	8.46 (3.00)	8.92*** (3.12)
Subjective knowledge[1] – self-rated (survey 2)	4.96 (2.54)	5.89*** (2.26)	
Subjective knowledge – self-rated (survey 2)	4.96 (2.54)	5.66 (2.33)	6.11*** (2.16)
Subjective knowledge – self-rated (survey 3)	5.30 (2.18)	5.43 (2.20)	
Subjective knowledge – self-rated (survey 3)	5.30 (2.18)	5.41 (2.22)	5.46 (2.18)

Notes: 1 - 14-item quiz scores; 2 - 0-10 Likert + don't know; s.d. in parentheses

=> Treatments worked 👍

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Beach Preferences (DCE 1) – baseline

Attributes	dist.	mean	s.d.
Status quo site	n	0.01*** (0.00)	0.06*** (0.00)
Guarded bathing site	n	0.47*** (0.01)	0.40*** (0.01)
Designated bathing site	n	0.33*** (0.01)	0.27*** (0.01)
Weather information	n	0.14*** (0.01)	0.10*** (0.00)
Water information – 1x/2 weeks (vs. 1x/month)	n	0.20*** (0.01)	0.15*** (0.01)
Water information – 1x/week (vs. 1x/month)	n	0.28*** (0.01)	0.22*** (0.01)
Water information – 1x/2 days (vs. 1x/month)	n	0.33*** (0.01)	0.27*** (0.01)
Water information – 1x/day (vs. 1x/month)	n	0.36*** (0.01)	0.30*** (0.01)
-Distance (in 10 km)	l	2.11*** (0.04)	1.52*** (0.04)

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Beach Preferences (DCE 1) – information effects

Attributes	dist.	mean	wave 2	wave 2 + info	wave 2	wave 2 + info comb.	wave 2 + info sep.
Status quo site	n	0.50*** (0.04)	0.07 (0.08)	-0.02 (0.06)	0.06* (0.03)	0.11 (0.11)	-0.12*** (0.05)
Guarded bathing site	n	2.44*** (0.08)	0.59*** (0.08)	0.20*** (0.06)	0.56*** (0.05)	0.19 (0.13)	0.26*** (0.08)
Designated bathing site	n	1.79*** (0.07)	0.43*** (0.09)	-0.02 (0.07)	0.42*** (0.06)	0.06 (0.09)	-0.02 (0.04)
Weather information	n	0.93*** (0.04)	-0.01 (0.07)	0.10* (0.05)	-0.03 (0.11)	0.04 (0.03)	0.17* (0.09)
Water information – 1x/2 weeks (vs. 1x/month)	n	1.28*** (0.05)	-0.28*** (0.09)	0.24*** (0.06)	-0.28*** (0.07)	-0.05 (0.12)	0.50*** (0.08)
Water information – 1x/week (vs. 1x/month)	n	1.85*** (0.08)	-0.17 (0.13)	0.33*** (0.10)	-0.19*** (0.04)	0.11 (0.15)	0.56*** (0.04)
Water information – 1x/2 days (vs. 1x/month)	n	2.30*** (0.08)	-0.31** (0.14)	0.33*** (0.09)	-0.33*** (0.05)	-0.01 (0.16)	0.68*** (0.05)
Water information – 1x/day (vs. 1x/month)	n	2.51*** (0.08)	-0.40*** (0.14)	0.17* (0.09)	-0.38*** (0.14)	-0.18*** (0.07)	0.53*** (0.05)
-Distance (in 10 km)	l	17.49*** (0.29)	0.53*** (0.10)	0.18* (0.10)	0.06 (0.12)	0.44*** (0.05)	0.40*** (0.05)

Water quality and monitoring preferences (DCE 2) – baseline (WTP-space, in EUR)

Attributes	dist.	mean	s.d.
Status quo	n	1.23 (1.27)	32.33*** (1.60)
Water quality – risk 10/1000 (vs. 20/1000)	n	7.78*** (0.75)	12.96*** (0.97)
Water quality – risk 4/1000 (vs. 20/1000)	n	12.36*** (0.95)	19.35*** (1.20)
Water quality – risk 2/1000 (vs. 20/1000)	n	12.21*** (1.10)	26.74*** (1.57)
Monitoring: 2x/1 month (vs. 1x/month)	n	3.81*** (0.72)	6.00*** (1.10)
Monitoring: 1x/week (vs. 1x/month)	n	8.05*** (0.75)	6.21*** (1.07)
Monitoring: 2x/week (vs. 1x/month)	n	7.53*** (0.79)	9.65*** (1.17)
Monitoring: 1x/day (vs. 1x/month)	n	6.20*** (0.99)	15.84*** (1.46)
-Cost (EUR)	l	0.16*** (0.01)	0.12*** (0.01)

Water quality and monitoring preferences (DCE 2) – information effects

Attributes	dist.	mean	info	info comb.	info sep.
Status quo	n	2.33 (1.75)	-1.86 (2.25)	-0.85 (2.56)	-3.12 (2.66)
Water quality – risk 10/1000 (vs. 20/1000)	n	6.49*** (1.08)	2.47* (1.32)	1.85 (1.55)	3.14** (1.57)
Water quality – risk 4/1000 (vs. 20/1000)	n	10.03*** (1.37)	3.87** (1.71)	3.31 (2.02)	4.55** (2.03)
Water quality – risk 2/1000 (vs. 20/1000)	n	8.95*** (1.62)	5.72*** (2.05)	5.49** (2.38)	6.05** (2.46)
Monitoring: 2x/1 month (vs. 1x/month)	n	4.64*** (1.05)	-1.50 (1.20)	-1.17 (1.41)	-1.73 (1.39)
Monitoring: 1x/week (vs. 1x/month)	n	7.57*** (1.06)	0.91 (1.19)	1.88 (1.40)	0.02 (1.41)
Monitoring: 2x/week (vs. 1x/month)	n	6.96*** (1.11)	1.06 (1.27)	2.17 (1.51)	0.05 (1.50)
Monitoring: 1x/day (vs. 1x/month)	n	4.54*** (1.44)	2.89* (1.64)	2.91 (1.92)	3.05 (1.93)
-Cost (EUR)	l	0.15*** (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)

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Summary & conclusions

- Two-wave panel DCE with randomized bathing-water pathogen information for users of Gdańsk Bay & Vistula Lagoon
- Information scripts clearly increased subjective and objective knowledge – treatments worked as intended
- After information, willingness to travel/pay for frequent monitoring and water quality rose substantially, especially under detailed information
- Overall: risk information selectively reshapes preferences for monitoring, so welfare measures are strongly information-dependent

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Policy implications

- Credible pathogen-risk information boosts demand for water quality and high-frequency monitoring
  - Baseline preferences may understate welfare gains from monitoring if information effects are ignored in BCA
- Information campaigns are relatively low-cost complements to physical safety and monitoring infrastructure – not substitutes
  - Targeted communication at vulnerable users (children, older adults, health-sensitive) can yield disproportionate welfare benefits
- Limitations: stated rather than revealed behaviour; attrition between waves
- Take-home message
  - Preferences are information-dependent
  - Smart risk communication is a powerful, scalable adaptation tool

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Thank You

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