



When risk information changes the trip

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THE PROBLEM

The risk is not observable

WHAT YOU SEE WHEN YOU CHOOSE A BEACH

Weather, waves, water temperature

The beach, the crowd, the amenities

Lifeguards, designated bathing area

Maybe the colour of the water

WHAT YOU DO NOT SEE

Microbial risk in the water

E. coli · intestinal enterococci · Vibrio spp. · cyanobacteria

Low probability, high salience, episodic — and more frequent as the water warms and the rain gets heavier.

Poland, 2023: 146 designated bathing sites closed for cyanobacteria, 41 for E. coli, 34 for enterococci.

The water does not come with a label. So what can move behaviour is monitoring, disclosure, warnings — and what people understand about the hazard.

The economic question. How much do those instruments move behaviour and welfare — and through which channel?

Three ways information can enter the welfare calculus

welfare = f (what I can do and its consequences , what I value , how I feel)

1

Current risk signals

change what I can do

Monitoring, forecasts, warnings and disclosure let me avoid exposure, switch site or go tomorrow. A timely signal changes recreational value and health outcomes.

priced in km travelled and € per year

2

Education

changes what I value

Once I understand pathogens, how exposure works and what prevents it, I may update my preferences — over risks, sites, and over the policies that address the hazard.

a randomised shift in those same km and €

3

Worry and burden

changes how I feel

The darker possibility. Telling people about a hazard they cannot avoid may simply lower the enjoyment of the same activity — a welfare loss, not a gain.

tested in trips, outings, water contact, swimming

All three are welfare-relevant in theory. We can measure all three here. Two of them turn out to be large. The third we went looking for, on four behavioural margins, and did not find.

Four waves, three instruments, one panel of the same people

Gulf of Gdańsk and the Vistula Lagoon — Poland’s most intensively used bathing coast.



The beach experiment

waves 1 and 2

Choose between two beaches, or status quo. We vary the lifeguard, whether the site is designated, a weather board, how often the water is tested — and how far you would have to drive.

→ willingness to travel, in km

The policy referendum

wave 3

Vote for or against a national bathing-water programme paid for by an annual household tax. We vary the infection risk it delivers (mitigation) and how often the water is tested (adaptation).

→ willingness to pay, in € per year

The travel-cost module

waves 1 and 3

How many trips to the coast, how many beach outings, how long you stayed, whether you went into the water, whether you swam — and where you live, which gives us the price.

→ what they actually did

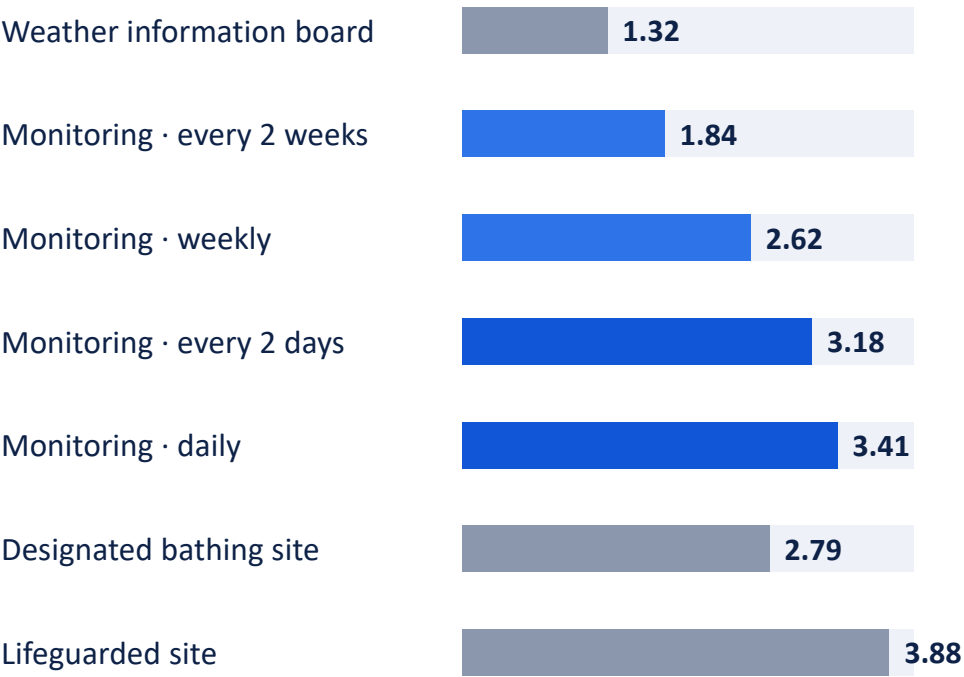
In wave 2 we randomised the information. A knowledge quiz alone is the control; the treated arms got the quiz plus a risk-information script — **detailed**, one screen at a time, or **aggregated**, the same content on one screen.

The engine. The same people do the same beach experiment before and after the script — each person against themselves, then differenced against the control.

Information already has a price — in kilometres and in euros

Baseline values, before any information. Mixed logit, full covariance, estimated in WTP space.

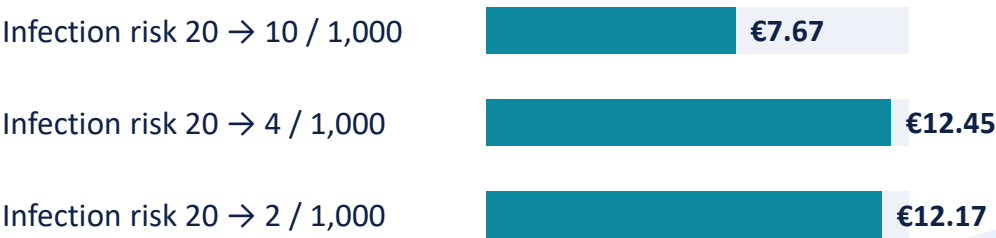
THE BEACH EXPERIMENT · willingness to travel (km)



all $p < 0.01$ · $n = 1,284$ · distance is the numeraire

THE REFERENDUM · willingness to pay (€ / household / year)

MITIGATION · less risk



ADAPTATION · knowing the risk

every level is against a baseline of monthly monitoring



all $p < 0.01$ · $n = 1,492$ · both are inside one programme

The point. People pay for mitigation — less risk — and, separately, for adaptation — knowing what the risk is.

What a visit to the Baltic is worth — from what people actually did

Travel-cost panel, n = 2,342. The price is road distance from home to the coast, the same rule for everyone.

CONSUMER SURPLUS

A beach outing — day-tripper	€45	[20–76]
A beach outing — staying at the coast	€27	[19–39]
The journey to the coast itself	€1,084	[674–2,383]
A whole season — day-tripper / visitor	€426 / €1,529	

HOW ROBUST

Own-price elasticities –0.2 to –0.9. The price coefficient is negative and significant in 100 % of 1,152 specifications across every count-data family.

TWO DECISIONS, NOT ONE

Within 50 km of the coast people take about 16 beach outings a season and two thirds never stay overnight. Beyond 250 km it is about 3.5 outings, and four in five arrive on a multi-day trip.

So we put both counts in one likelihood, sharing one latent taste for the sea.

Correlation between the two counts
the independence separate models assume is rejected **0.42**

One extra journey → beach outings
s.e. 0.15, p = 0.004, holding the taste fixed **– 0.43**

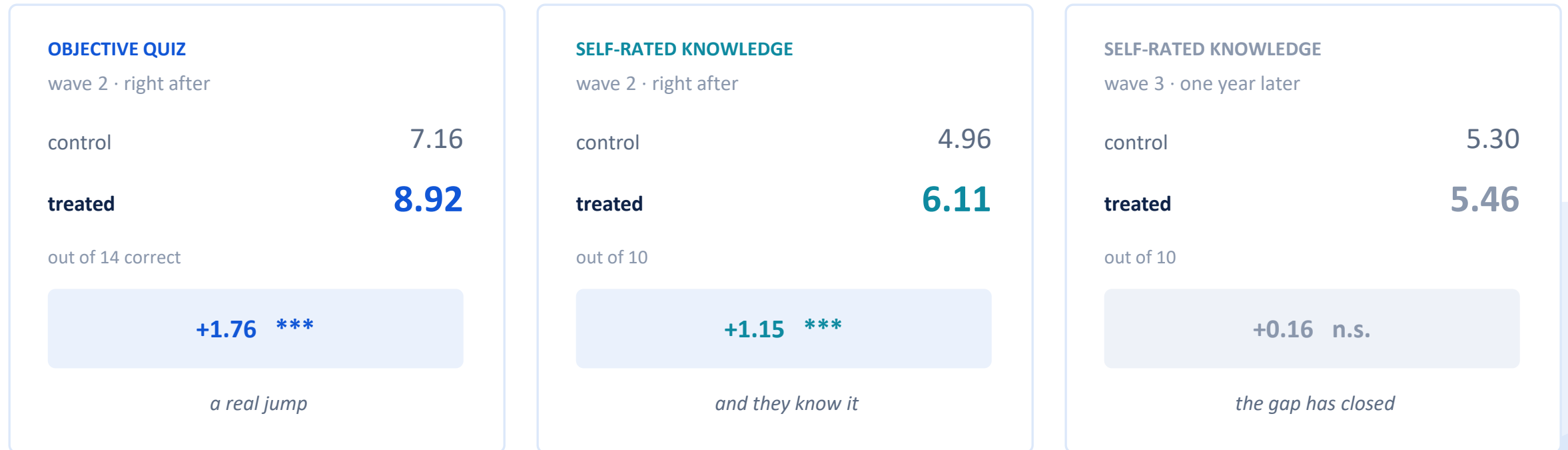
Complements overall — substitutes once the shared taste is held fixed.

Why this matters. It is the denominator for things that follow.

DID THE INFORMATION LAND?

Yes — but a year later they no longer think they know more

Knowledge before and after the information screens. Treated arms against the quiz-only control.

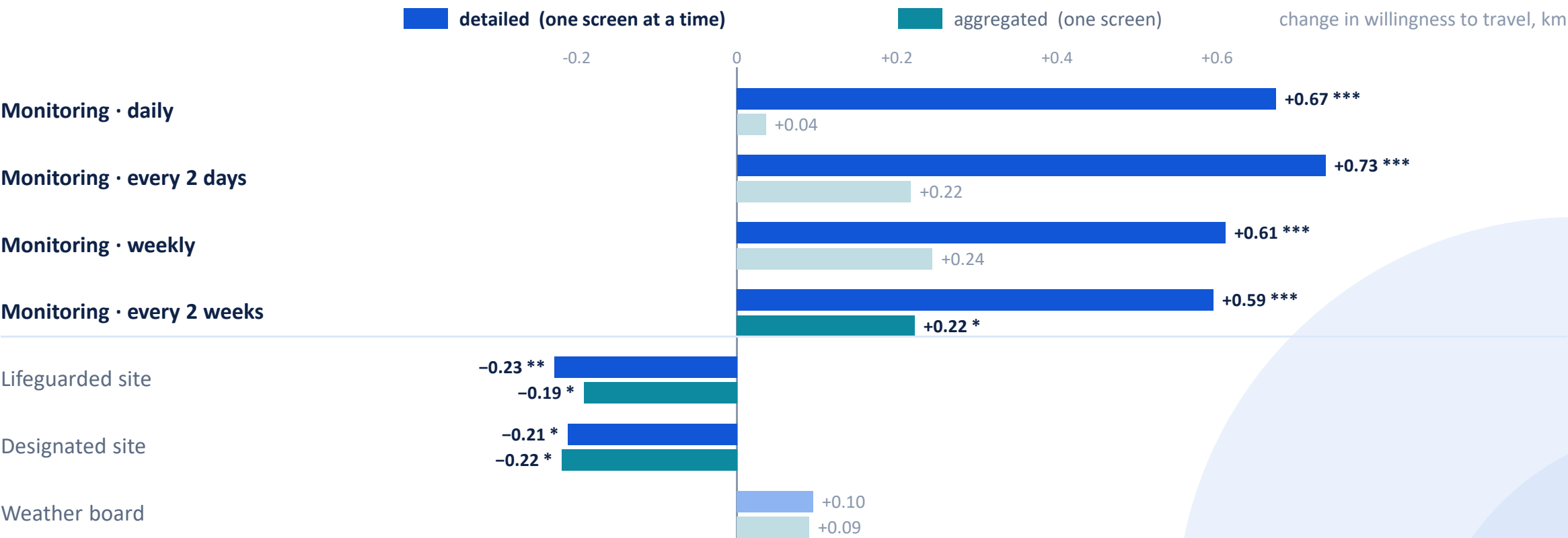


There is no objective quiz in wave 3. So what closes is the gap in what people *think* they know. Whether the facts went with it, we cannot say.

Hold this thought. A year on they no longer feel better informed. The next two slides show that their valuations still differ.

Right after the script they pay more for the signal — and less for its substitutes

Difference-in-differences on the beach experiment. Each bar is the treatment effect against the quiz-only control.



Against baselines of 1.8 to 3.4 km, the monitoring effects are a 20–30 % increase. *** p<0.01, ** p<0.05, * p<0.10.

Not just selective — a substitution. Every monitoring level gains 0.6–0.7 km. Lifeguards and official designation lose about 0.2.

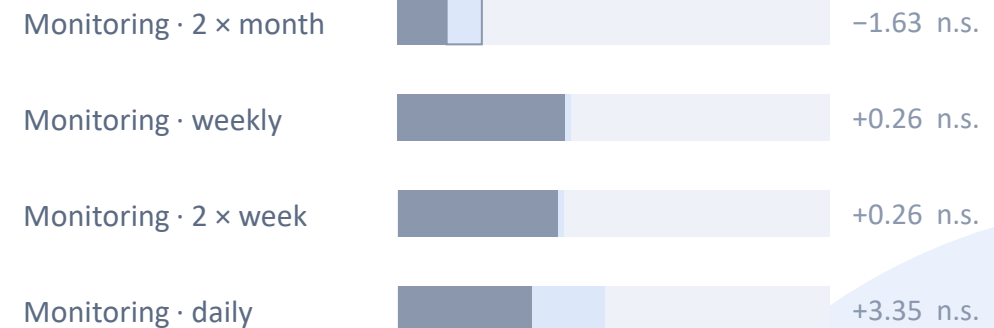
A year later they pay more for the substance — not for the signal

Policy referendum in wave 3, detailed arm. Grey is the baseline value; colour is what the information added.

MITIGATION · reducing infection risk



ADAPTATION · monitoring frequency



None of the four reaches 5 % (daily is the closest, at $p = 0.09$).

AND LOOK AT THE SHAPE, NOT ONLY THE SIZE

Before the information, willingness to pay flattens at the top of the range — €12.45 for 20 → 4 and €12.17 for 20 → 2. After it, the profile keeps rising: €17.46 and €19.12. The treated respondents are sensitive to the size of the improvement where the control group is not.

Tested across arms the last increment is +€1.94, $p = 0.195$.

The arc. Short run they pay for the signal; a year later for the substance. The monitoring premium fades like salience — what stays is a changed view of the problem?

What they did over the following year did not change

Same panel, same travel-cost module, twelve months apart. Treated arms against the quiz-only control.

FOUR BEHAVIOURAL MARGINS

	detailed	aggregated
Trips to the coast	-0.08	-0.13
Beach outings	+0.12	+0.15
How much distance deters them	n.s.	n.s.
Going in the water, and swimming	n.s.	n.s.

AND NOT ONE OF THEM IS SIGNIFICANT

None of 48 tests reaches 5 %, even before correcting for multiple testing. Compared instead against the group that skipped the middle wave altogether, the answer is the same.

BUT WHAT ABOUT THE VULNERABLE?

If worry is anywhere, it is here. Vulnerability is measured in wave 1, before anybody was treated.

Beach outings	+0.66	p = 0.08
Multi-day trips	-0.70	p = 0.06
Going in the water	+0.10	n.s.
Swimming	+0.17	n.s.

More local outings, fewer long trips. A multi-day trip commits you to a place months ahead; a local outing you can call off on the day. Substitution, not withdrawal? But neither reaches 5 %.

But low power problem. Not “information does not change behaviour”, but “not by anything a panel this size could see”.

We can put both halves of the study in the same units, and check

The one thing that makes the stated values usable in an appraisal — or not.

1 What we compare

The beach experiment says how many kilometres a monitored site is worth. Wave 1 separately asks which of those attributes your own usual beach actually has.

2 How

Score everybody’s real beach in kilometres using their own stated values — call it Q, mean 5.96 km. Put Q into the demand for outings, next to the distance they actually travel.

3 Why it can fail

If stated preferences generate behaviour, a kilometre of quality and a kilometre of travel are the same kilometre. No free scale parameter, so the restriction can be rejected.

Does stated quality predict real trips?

+0.40 yes — s.e. 0.11, t ≈ 3.8, n = 2,695

Is a km of quality worth a km of travel?

≥ 1 point estimates 1.1 to 5.8, never below 1

The same attribute, priced twice

€8.01 vs €7.45 beach experiment vs referendum, monitoring every 2 days

If stated values were inflated the ratio would sit below 1. Two caveats: Q is cross-sectional, and 52 % said “don’t know” on at least one attribute.

The reconciliation. A 1 km shift on trips is not a lot, likely <1% change, while our panel can see identify about 30%+ changes.

The benefit of a programme depends on what the public has been told

Compensating variation for a national programme: the uninformed arm against the arm informed a year earlier.

PROGRAMME	uninformed	informed	difference	95 % interval	change
Risk 20 → 4 / 1,000 + weekly monitoring	€17.66	€22.94	+5.28	[−0.03, 10.49]	+30 %
Risk 20 → 2 / 1,000 + twice-weekly	€15.93	€23.13	+7.19	[0.98, 13.62]	+45 %
Risk reduction only	€10.46	€15.44	+4.98	[0.98, 8.98]	+48 %
Monitoring only, monthly → weekly	€7.20	€7.50	+0.30	[−2.43, 2.99]	+4 % n.s.

€ per household per year · n = 1,492 · a national aggregate over ~14.2 M households is €71–102 M a year

These are not two estimates of one policy. They are two policies. One informs the public about the hazard and then cleans the water; the other only cleans the water. The first is worth more, and it also lets the people most at risk adapt better.

So the question is not which number to use. It is whether communication belongs inside the policy being appraised.

What we can now say about each door information comes through

1 Current risk signals change what you can do

LARGE AND MEASURED

- Priced, and large: 1.8–3.4 km of extra driving, €3.9–7.8 a year — on top of what people pay for the risk reduction itself.
- And the vulnerable look like the ones who use them: more flexible local outings, fewer committed multi-day trips.

2 Education changes what you value

LARGE AND MEASURED

- Immediately: +0.6–0.7 km for monitoring.
- A year later: 45 % more for reducing the risk, nothing for monitoring — even though the gap in how well informed people feel has closed.
- And the shape changes: the treated respondents' WTP keeps rising with the size of the improvement.

3 Worry and burden changes how you feel

LOOKED FOR, NOT FOUND

- Not found. Four behavioural margins, 48 tests, none at 5 % — including going in the water and swimming.
- Same answer against the group that was never informed at all.
- But the honest limit is that this panel could only have seen a change of about a third or more.

And what that adds up to. The stated values survive contact with behaviour, so they belong in the appraisal — but which of them you get depends on a policy choice.

THANK YOU

When risk information changes the trip

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Horizon Europe · adaptation to climate-driven health risks in coastal waters.

The beach experiment — difference-in-differences in km

Mixed logit, full covariance, WTP space. n = 1,284; 24 tasks per person. The last two columns are the treatment effects against the quiz-only control. Wave-1 level is this model’s own reference cell, so it sits a little above the pooled baseline shown earlier.

Attribute	Wave-1 level	Wave-2 drift	DiD: aggregated	DiD: detailed
Lifeguarded bathing site	4.06	+0.14 *	−0.19 *	−0.23 **
Designated bathing site	2.95	+0.06	−0.22 *	−0.21 *
Weather information board	1.37	−0.03	+0.09	+0.10
Water monitoring · daily	3.59	−0.26 **	+0.04	+0.67 ***
Water monitoring · every 2 days	3.37	−0.32 **	+0.22	+0.73 ***
Water monitoring · weekly	2.70	−0.16	+0.24	+0.61 ***
Water monitoring · every 2 weeks	1.88	−0.20 **	+0.22 *	+0.60 ***
Scale (distance coefficient)	9.96	+0.53 ***	−0.04	+0.50 ***

The referendum a year later — every contrast

Mixed logit, full covariance, WTP space, € per household per year. n = 1,492. The stepdown column is Romano–Wolf over the whole family.

Contrast	Estimate	Std. err.	p	stepdown p
Risk 20 → 10 / 1,000 · detailed	+3.45	1.59	0.030	0.275
Risk 20 → 4 / 1,000 · detailed	+5.01	2.03	0.013	0.154
Risk 20 → 2 / 1,000 · detailed	+6.95	2.50	0.005	0.070
Risk 20 → 2 / 1,000 · aggregated	+6.01	2.45	0.014	0.154
Monitoring · daily · detailed	+3.35	1.96	0.088 n.s.	0.531
Monitoring · weekly and 2× week · detailed	+0.26	1.41	0.853 n.s.	0.992
Mean mitigation effect · detailed	+5.13	1.88	0.006	—
Mean monitoring effect · detailed	+0.56	1.24	0.653 n.s.	—
Mitigation minus monitoring · detailed	+4.57	1.97	0.020	—
Scope increment 4 → 2, difference across arms	+1.94	1.50	0.195 n.s.	—
Scale (cost coefficient) · detailed	+82.1	85.1	0.334 n.s.	—

Revealed preference — the model ladder and the joint model

Single-site count models on the travel-cost panel. The price is road distance from home to the coast, the same rule for everyone.

Quantity	Estimate	Interval / s.e.	Note
CS per beach outing · day-trippers	€45	[20–76]	two-part model, wave 1
CS per beach outing · visitors	€27	[19–39]	the marginal visit is cheap
CS per access trip · visitors	€1,084	[674–2,383]	least precise number here
Seasonal CS · day-trippers / visitors	€426 / €1,529	—	do not average the two
Own-price elasticity, across families	–0.2 to –0.9	—	negative in every family
Specification curve	1,152 specs	100 % negative & significant	twelve count families
Joint model · shared taste loading σ_2	1.20	implied correlation 0.42	independence rejected
Joint model · one extra access trip → outings	–0.433	s.e. 0.150, p = 0.004	conditional substitutes
Same, keeping the access price in eq. 2	–0.440	s.e. 0.172	the exclusion is not carrying it

The stated-to-revealed test, in full

Q is the respondent’s own usual beach, scored in kilometres with their own stated values. The restriction is that a kilometre of quality equals a kilometre of travel — an over-identifying restriction with no free scale.

Sample	n	g on distance	g on quality	ratio	95 % interval
All respondents	2,695	−0.069 (0.031)	+0.403 (0.107)	5.84	[1.90, 26.06]
Excluding “don’t know”	1,276	−0.108 (0.028)	+0.117 (0.154)	1.08	[−1.94, 4.64]
Day-trippers only	389	−0.116 (0.056)	+0.558 (0.277)	4.80	[−1.36, 24.33]
Visitors only	2,306	−0.192 (0.034)	+0.344 (0.090)	1.79	[0.83, 3.24]
Monitoring daily · km → € per year	—	3.66 km	€8.57	vs €6.25	from the referendum
Monitoring every 2 days · km → €	—	3.43 km	€8.01	vs €7.45	ratio 1.08
Monitoring weekly · km → €	—	2.84 km	€6.65	vs €7.76	—