Sun Protection Behaviours at the Beach: Real-time Insights to Inform Skin Cancer Prevention in Spain

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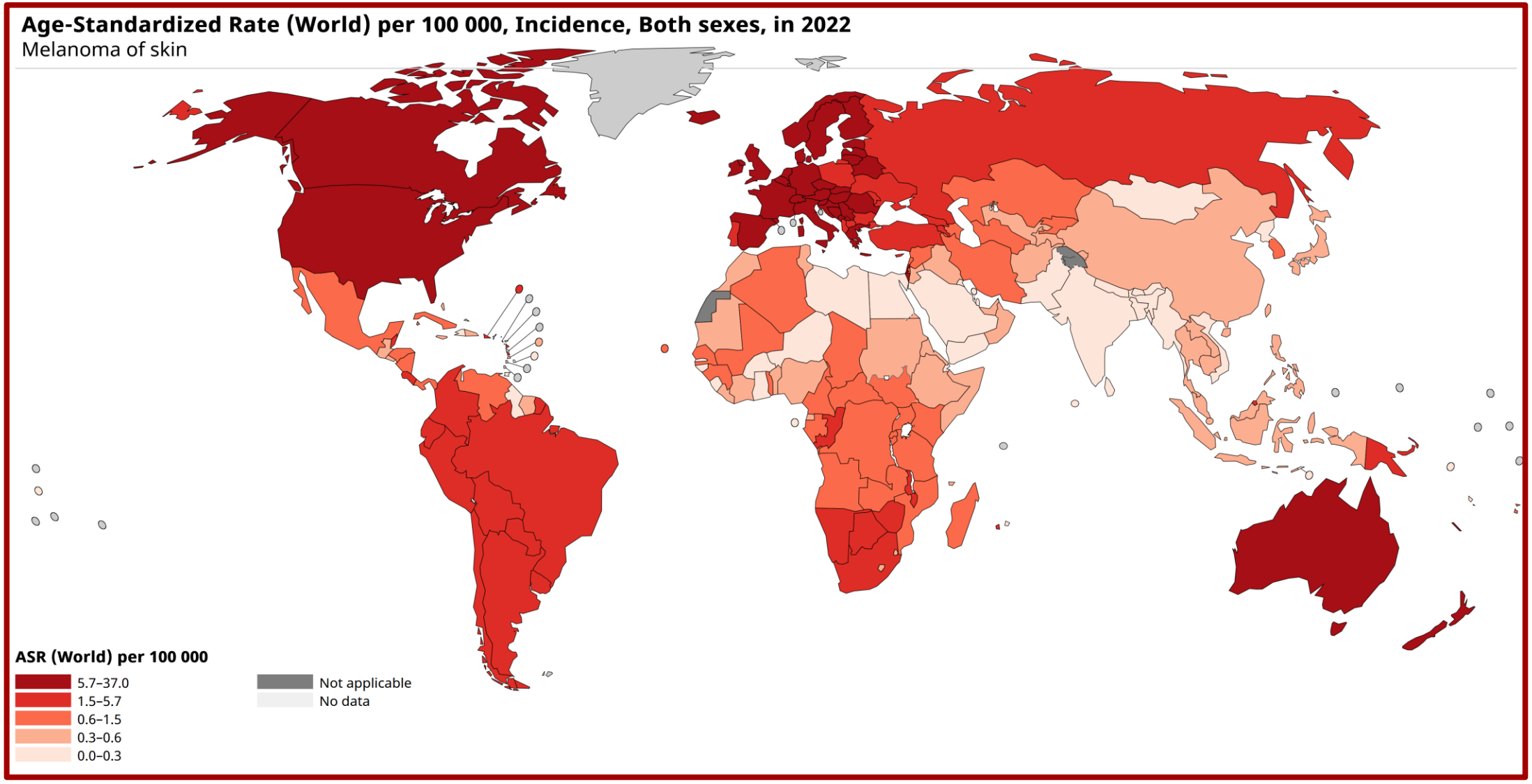
Why this study?

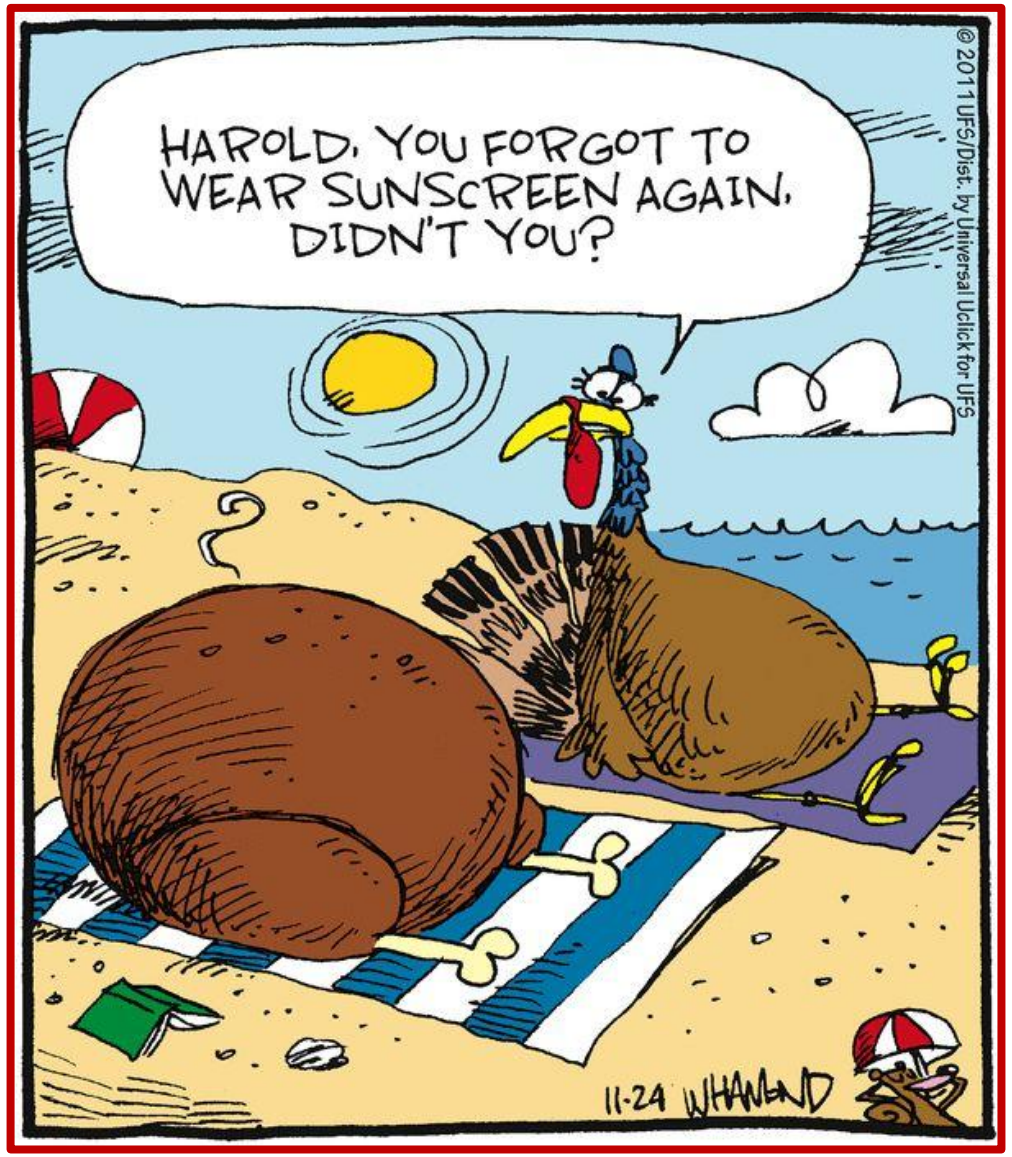
web data opp



Cancer TODAY | IARC
https://gco.iarc.who.int/today
Data version: Globocan 2022 (version 1.1) - 08.02.2024

International Agency for Research on Cancer
World Health Organization

Harold Knows



What the literature says people do

Cross-national evidence on sun-protection behaviours: the baseline against which our Spanish beachgoers will be compared.

79%

use sunscreen on the beach

Sunscreen is the default

It is the lead measure almost everywhere studied, from Spanish coasts to international cohorts.

Spanish beachgoers: de Troya-Martín et al., 2018

22% / 19%

wear hats / t-shirts on the beach

Protective clothing lags

The most reliable barrier. The most ignored

de Troya-Martín 2018; Blázquez-Sánchez 2021

53–59%

of beachgoers reapply every two hours

Initial use ≠ sustained use

Among UK healthcare workers the figure falls to ~27%. Reapplication is the consistent weak link.

Cercato 2014, 2015; Sultana 2020

~½

of beachgoers arrive between 12:00 and 15:00

Peak-hour exposure persists

Observational studies have recorded ~90% of beachgoers in swimwear when UV is most intense.

Petrou 2023; observational beach studies

Not a Knowledge Deficit, but a Knowledge Contamination

What the evidence supports

>80%	Beachgoer knowledge score *Petrou 2023; Truchuelo 2025*
96%	Lifeguards link sun exposure to skin cancer *de Troya-Martín 2018*
High	Awareness of the UV-index is widespread *Sultana 2020*

What is mistakenly believed

20%	Can accurately define the UV-index *Sultana 2020*
45%	Believe high SPF permits longer sun exposure *Pallero-Flores 2024*
~50%	Of parents use “redness” as the cue to reapply *Norman et al.*
~55%	Associate tanning with skin damage *Truchuelo 2025*

Research Questions

Few studies examine:

- Knowledge
- Attitudes
- Environmental conditions
- Demographics, simultaneously using objective contextual data.

RQ1: How do Spanish beachgoers protect themselves from sun exposure?

RQ2: What knowledge and attitudes do they hold?

RQ3: What predicts sunscreen use, and through what mechanisms?

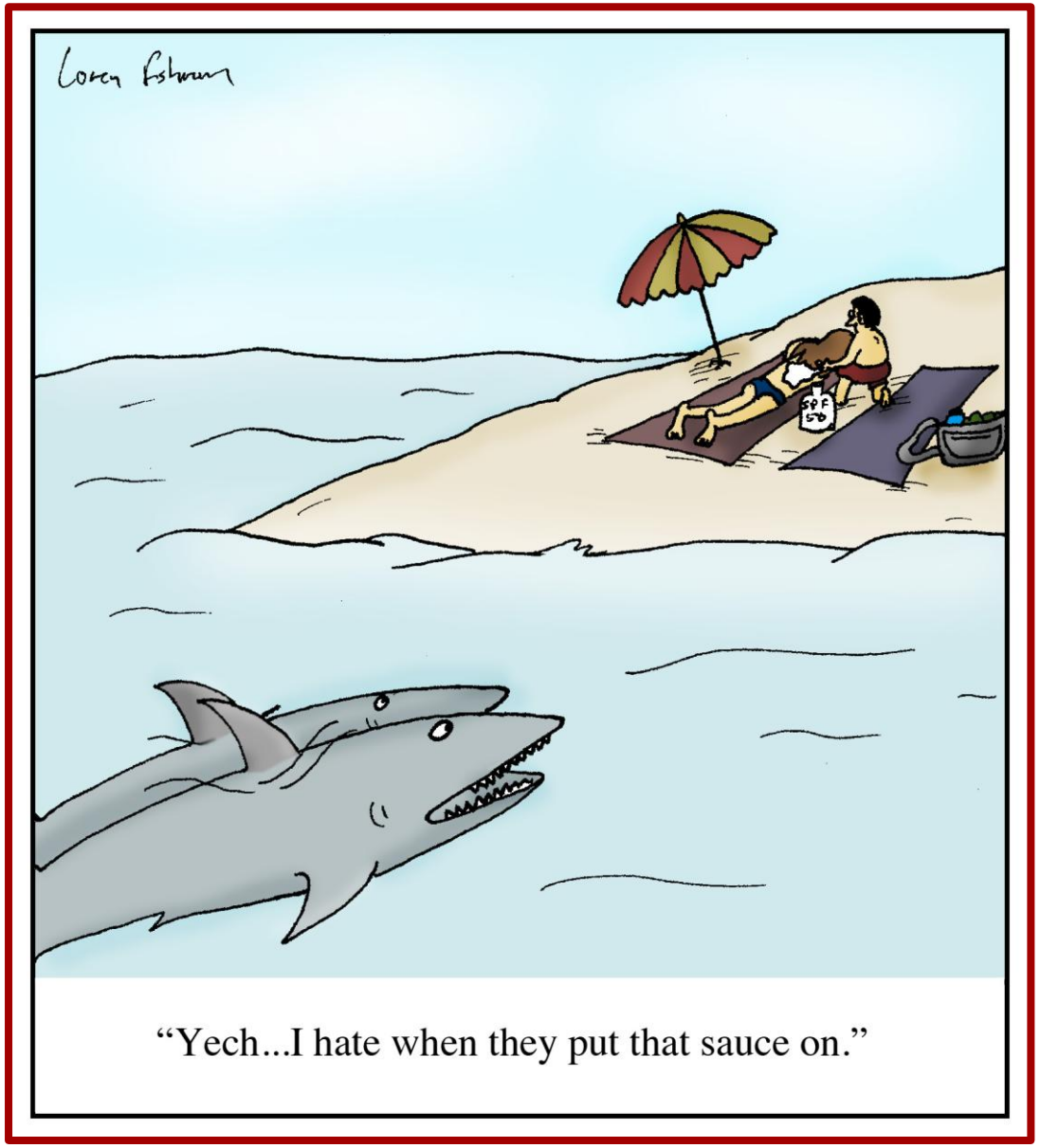
Substantive

- Explains the knowledge–behaviour gap
- Examines beach-specific protection behaviour
- Integrates environmental and attitudinal factors

Methodological

- Geolocation-triggered surveys
- In-the-moment behavioural measurement
- Integration of UV + temperature data
- Visual/photo data collection

Sharks vs. Sunscreen



Methods in Brief

Innovative survey design
GPS-triggered surveys were sent 1 hour after participants were detected at 2,480 Spanish mainland beaches.

Reducing measurement error
The in-the-moment design helped reduce recall bias and social desirability effects.

Additional contextual data
Survey responses were linked to UV radiation, temperature, and participant photo uploads.

Final sample
Final sample: N = 454 | 53.5% women | Mean age = 49 | 92% smartphone completion.

Analytical approach
Descriptive analyses were used for RQ1/RQ2 and Structural Equation Modelling (SEM) was used to analyse predictors of sunscreen use.

RQ1: Sun Protection Behaviours

Main findings

- 94.8% used at least one protection method.
- 75.5% used multiple protection methods simultaneously.
- 76.4% arrived outside peak UV hours.

SPF use

- 81.8% of sunscreen users used SPF 50 or higher.
- Only 2.6% used SPF below 30.

Key behavioural gap

- Protective clothing remained extremely underused.

Measure	Proportion (%)
Sunscreen	78.9
Sunglasses	63.9
Umbrella	45.7
Hat	38.9
Protective clothing	7.3

RQ2: Knowledge and Attitudes

web data opp

Knowledge

- 83.2% answered all knowledge items correctly.
- More than 90% correctly identified:
  - skin aging risks
  - skin spots
  - peak UV timing
  - continued sunscreen need after tanning

Pro-tanning attitudes

- 64.7% agreed clothes look better with a tan.
- 48.5% reported feeling better after sun exposure.
- Only 31.6% considered sunbathing healthy.

Attitudes toward protection

- 95.4% considered sunscreen worthwhile.

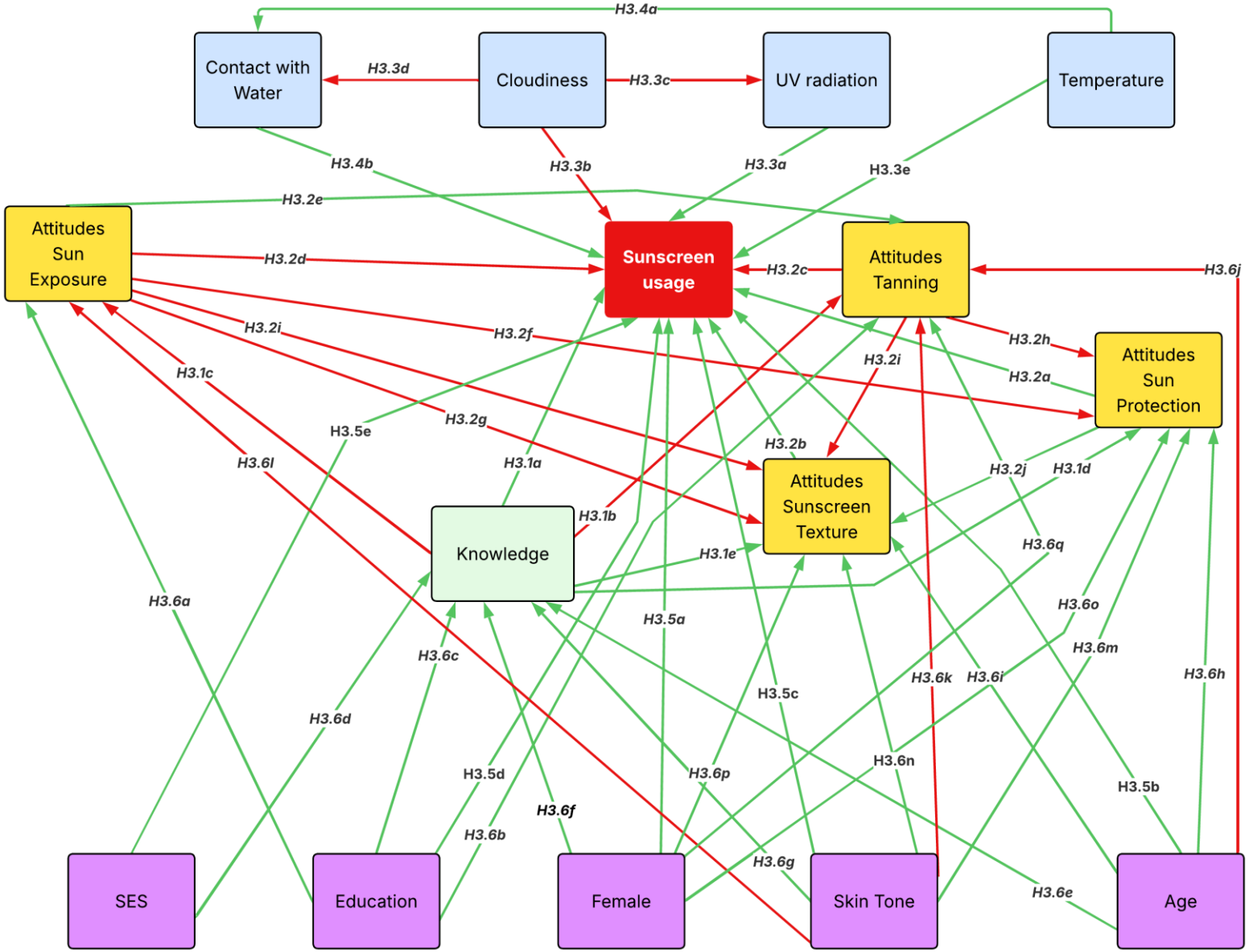
Sunscreen texture attitudes

- Only 28% held favourable attitudes toward sunscreen texture.
- 52.3% remained neutral.

Key interpretation

Protection behaviour appears linked to appearance, enjoyment, comfort, and wellbeing.

The SEM Model



Correlations between the X variables not represented. Green arrows indicate expected positive effects while red arrows indicate expected negative effects.

RQ3: Predictors of Sunscreen Use

Significant Positive Predictors	Effect
Sun protection attitudes	+0.25
Water contact	+0.18
Texture attitudes	+0.15
UV radiation	+0.09

Significant Negative Predictors	Effect
Cloudiness (direct effect)	−0.13
Pro-tanning attitudes	−0.12

Additional findings

- Women were more likely to use sunscreen than men.
- Cloudiness also indirectly reduced sunscreen use through lower UV levels.

Final model fit: $\chi^2(59) = 42.99$, $p = 0.94$; RMSEA = 0.00; CFI = 1.00; SRMR = 0.026

1 **Knowledge had *no* direct effect on sunscreen use**
Knowledge mainly influenced behaviour through attitudes.

2 **Knowledge slightly increased pro-tanning attitudes**
This may reflect greater perceived control over UV risks.

3 **Positive sun exposure attitudes increased sunscreen use**
People who enjoy sun exposure may use protection to maintain that enjoyment safely.

What should change

1 Attitudes, not information

Spanish beachgoers have the knowledge. They do not have the behaviour. Shift campaigns from facts to attitudes.

2 The cloudy-day misconception

Real-time UV displays at beach entrances, weather-specific push notifications, integration into national weather apps.

3 Take texture seriously

Only ~28% of beachgoers actually like the product they use. Formulation is a public-health priority, not just a cosmetic one.

What should change

4 The appearance conflict

Frame protection as preserving long-term aesthetics by preventing photoaging, thus resolving the tanning tension.

5 Water contact as trigger

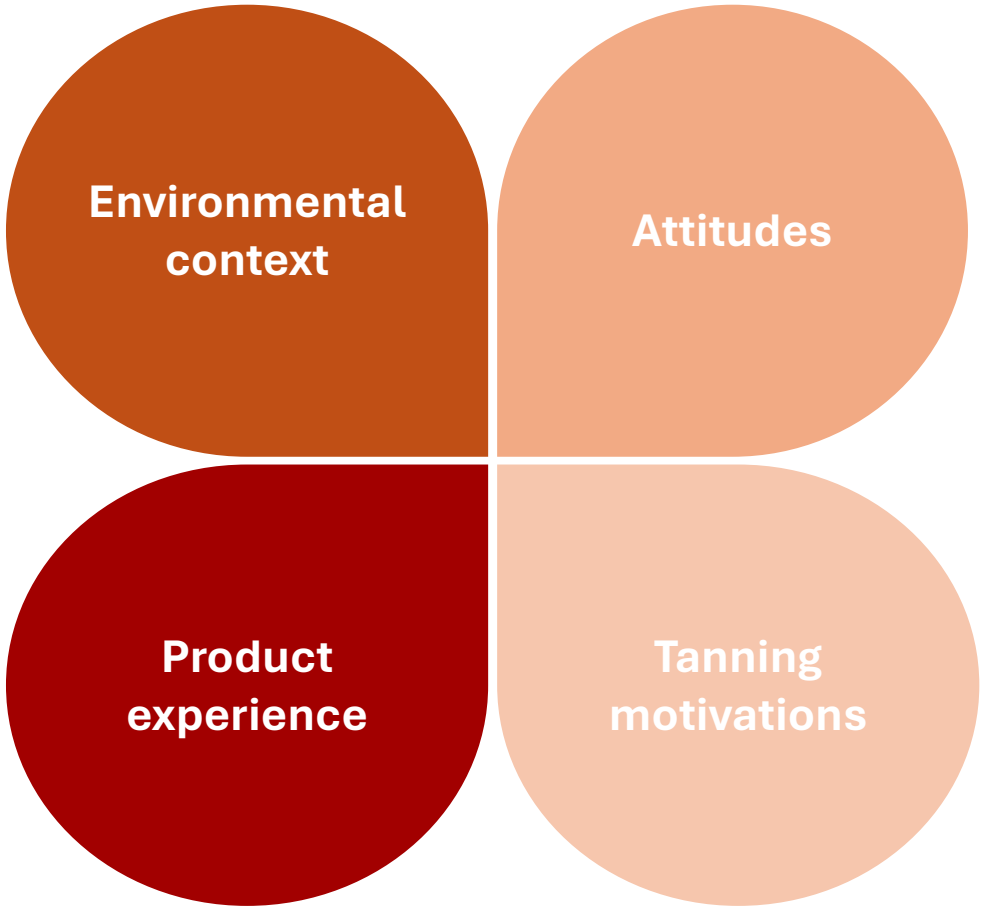
Place dispensers at beach showers and changing areas. The water-contact pathway is one of the strongest in our model.

6 Protection enables enjoyment

Reframe sun-protection as enabling beach life, not restricting it. Sun-lovers are the population to design for.

Conclusions

Behaviour is shaped by:



Knowing ≠ acting.

The gap between knowing about UV risk and acting on it is **not**, principally, **a knowledge problem**.

What predicts sunscreen use is:

- **how they feel** about sun, tanning and the product
- **the conditions** they were in,
- **and water contact.**

A methodology built for context worked well.

- In-the-moment geolocation surveys
- External Weather Data
- SEM

Context and timing matter for future use.

Thank you

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