

# INDOOR TANNING: PREVALENCE, TRENDS AND DETERMINANTS FROM THE EUROMELANOMA CAMPAIGN

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## Background & Rationale

- The World Health Organization (WHO) in 2009 classified **UV radiation (used in indoor tanning devices) as Group 1 carcinogen** (carcinogenic to humans).
- Sunbeds emit high-intensity UVA radiation that can induce DNA damage in skin cells.
- Sunbed use is associated with a significant increase in **risk of melanoma**.
- The risk increases with the **number of sessions**.
- Regular use before age 35 increases melanoma risk by **≈ 75 %**.
- Usage in Europe is driven mainly by young, urban women with **sun-seeking and other risk behaviours**, and is more prevalent in northern, low-sunshine countries, with some southern exceptions.
- Despite public-health efforts, prevalence data across European countries remain fragmented.
- The **Euromelanoma campaign** provides a unique pan-European platform for behavioural surveillance.

### Objectives:

1. Estimate the prevalence of indoor tanning across European countries.
2. Describe temporal trends from 2009 to 2018.
3. Identify sociodemographic and geographic determinants of indoor tanning use.

## Methods

**Study design:** Cross-sectional survey embedded in the annual Euromelanoma skin-cancer-awareness campaign.

### Population & sampling:

- Participants visiting dermatology clinics across **30 European countries**, 2009–2018.
- Consecutive enrolment on campaign days.
- Total sample: **N = 391 489** participants.

### Exposure definition:

Self-reported use of indoor tanning devices  $\geq 1$  session in the previous 12 months.

### Variables collected:

- Sociodemographic: age, sex, education, country.
- Behavioural: sunscreen use, sunburn history, outdoor tanning habits, skin phototype.

### Statistical analysis:

- Prevalence estimates by country and year.
- Multivariable logistic regression for determinants (adjusted OR with 95 % CI).

## References

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- [3] Bataille V, Boniol M, et al. *European Journal of Cancer* 2005;41(14). <https://doi.org/10.1016/j.ejca.2005.04.038>
- [4] Dessinioti C, Stratigos AJ. An epidemiological update on indoor tanning and the risk of skin cancers. *Current Oncology* 2022;29(11):8886–8903. <https://doi.org/10.3390/curronco129110699>
- [5] Dissel M, Rotterdam S, Altmeyer P, Gambichler T. Indoor tanning in North Rhine-Westphalia Germany: a self-reported survey. *Photodermatol Photomed Photobiol* 2009;25(2):94–100. <https://doi.org/10.1111/j.1600-0781.2009.00417.x>

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## Results – Temporal Trends & Determinants

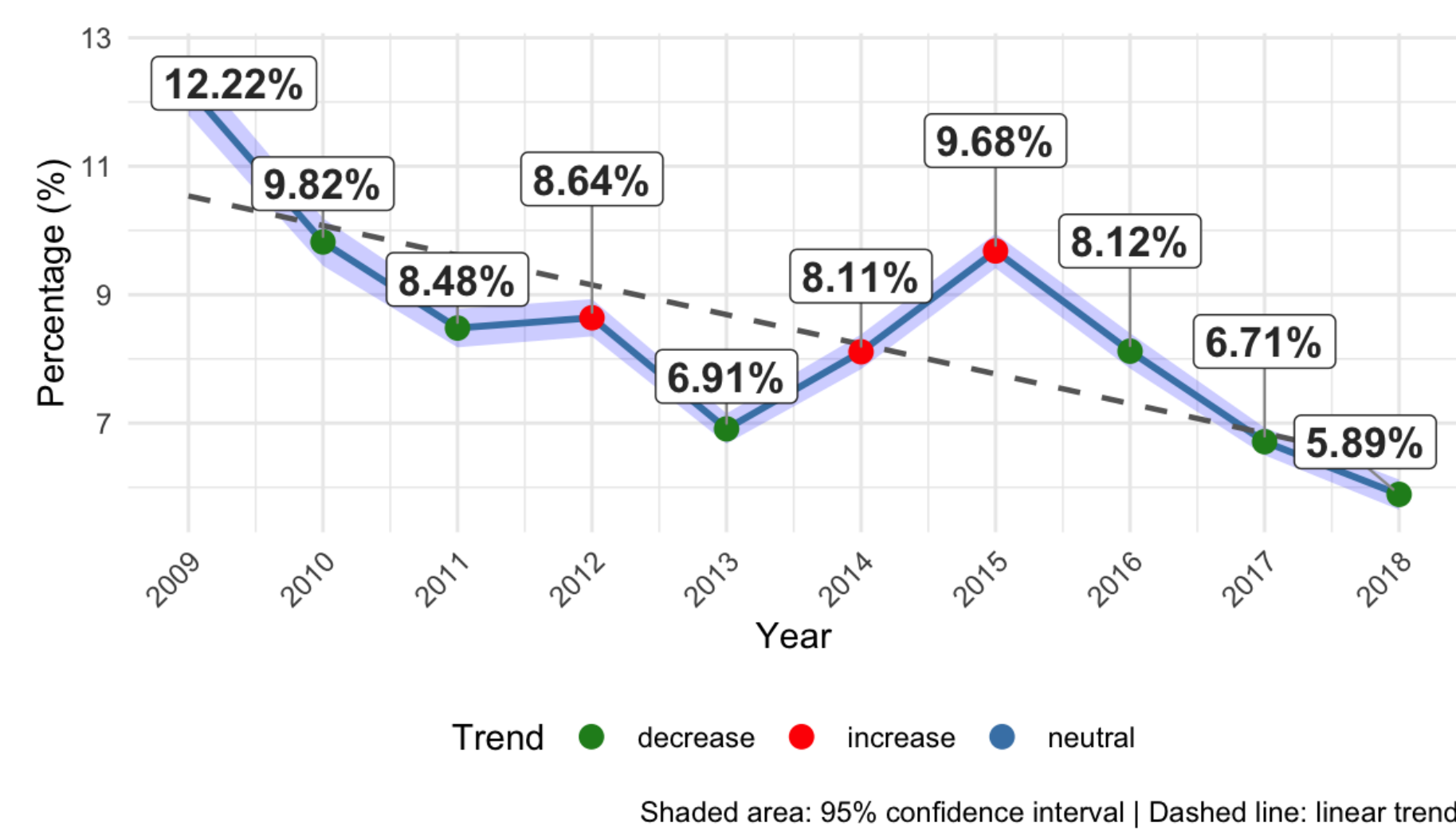


Figure 1. Temporal trend in overall sunbed use, 2009–2018. Points represent yearly prevalence estimates.

Overall sunbed use prevalence Figure 1 **declined from 12.22 % in 2009 to 5.89 % in 2018** (a reduction of over 50 %), with a clear downward linear trend. Year-to-year fluctuations were observed, with transient increases in 2012 and 2015, but the overall trajectory remained consistently negative.

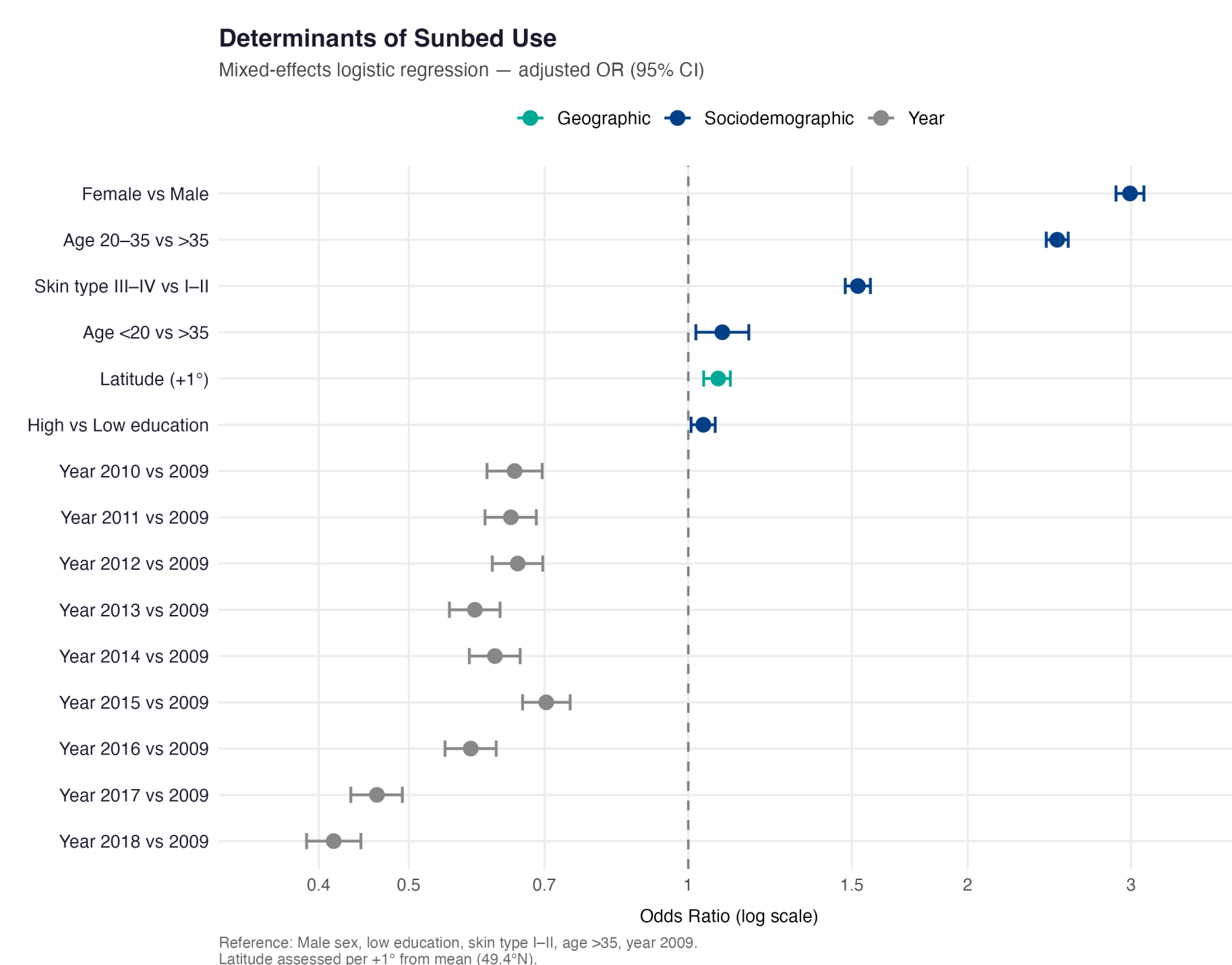


Figure 2. Mixed-effects logistic regression (country as random effect). Adjusted odds ratios with 95 % CI.

**☛ Sunbed use declined by over 50 % from 2009 to 2018. It remained most prevalent among women, young adults aged 20–35, and in northern, high-latitude countries.**

- Sunbed use **declined steadily** from 2009 to 2018, with odds of use in 2018 reduced by **58 %** compared to 2009 (OR = 0.42; 95 % CI: 0.39–0.44) (Figure 2).
- **Female sex** was the strongest predictor of sunbed use (OR = 2.99; 95 % CI: 2.89–3.10), followed by **age 20–35 years** (OR = 2.50; 95 % CI: 2.43–2.57) and **skin phototype III–IV** (OR = 1.52; 95 % CI: 1.48–1.57) compared to their respective reference categories (Figure 2).
- **Younger age** (<20 years) was also associated with increased use (OR = 1.09; 95 % CI: 1.02–1.16), while **higher education** showed a modest positive association (OR = 1.04; 95 % CI: 1.01–1.07).
- Each additional degree of **latitude** was associated with an increase in the odds of sunbed use (OR = 1.08; 95 % CI: 1.04–1.11), confirming higher prevalence in **northern, low-sunshine countries** (Figures 2–4).

 **For more information**  
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## Results – Geographic Determinants

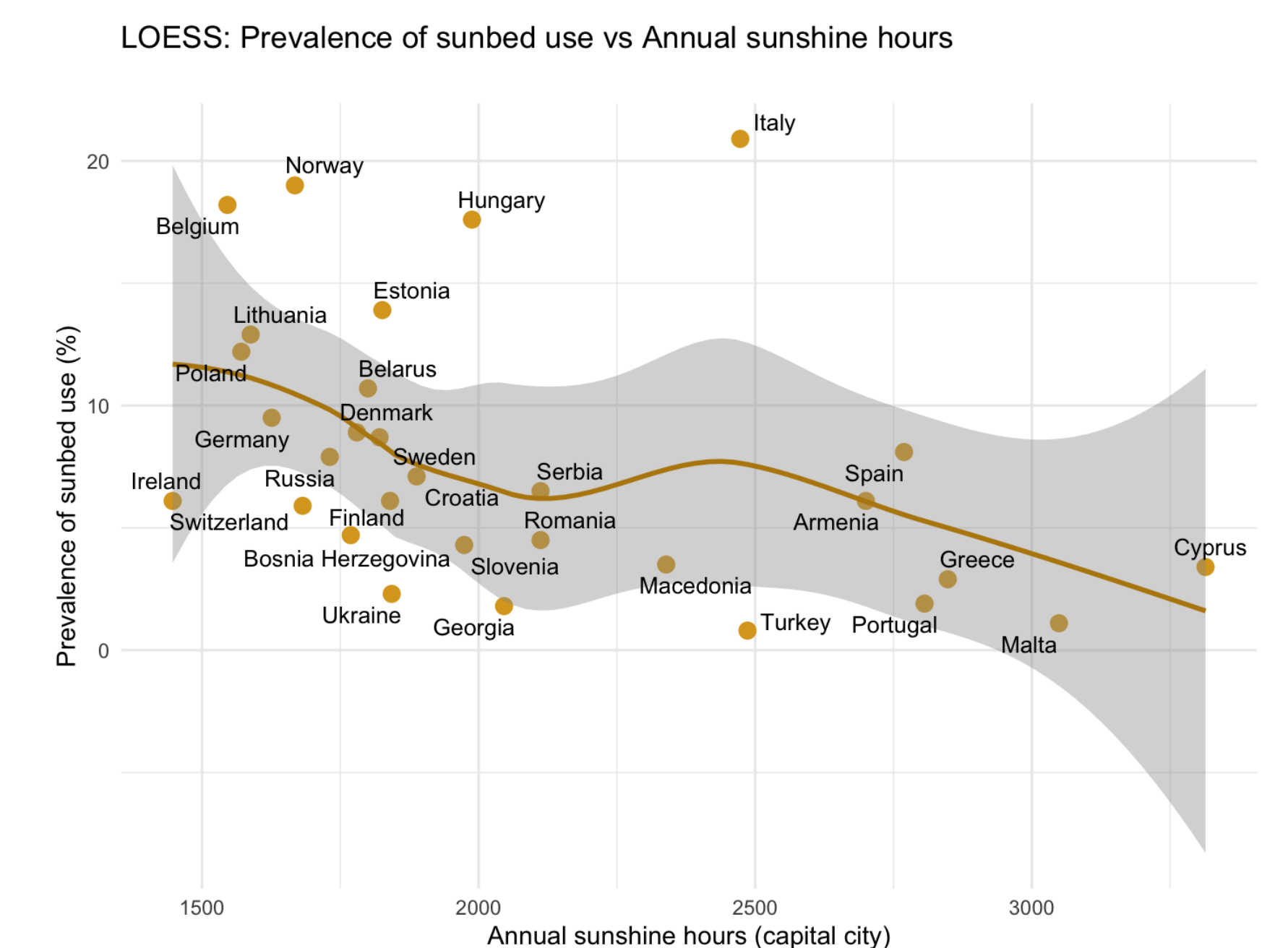


Figure 3. Association between annual sunshine hours and sunbed use prevalence.

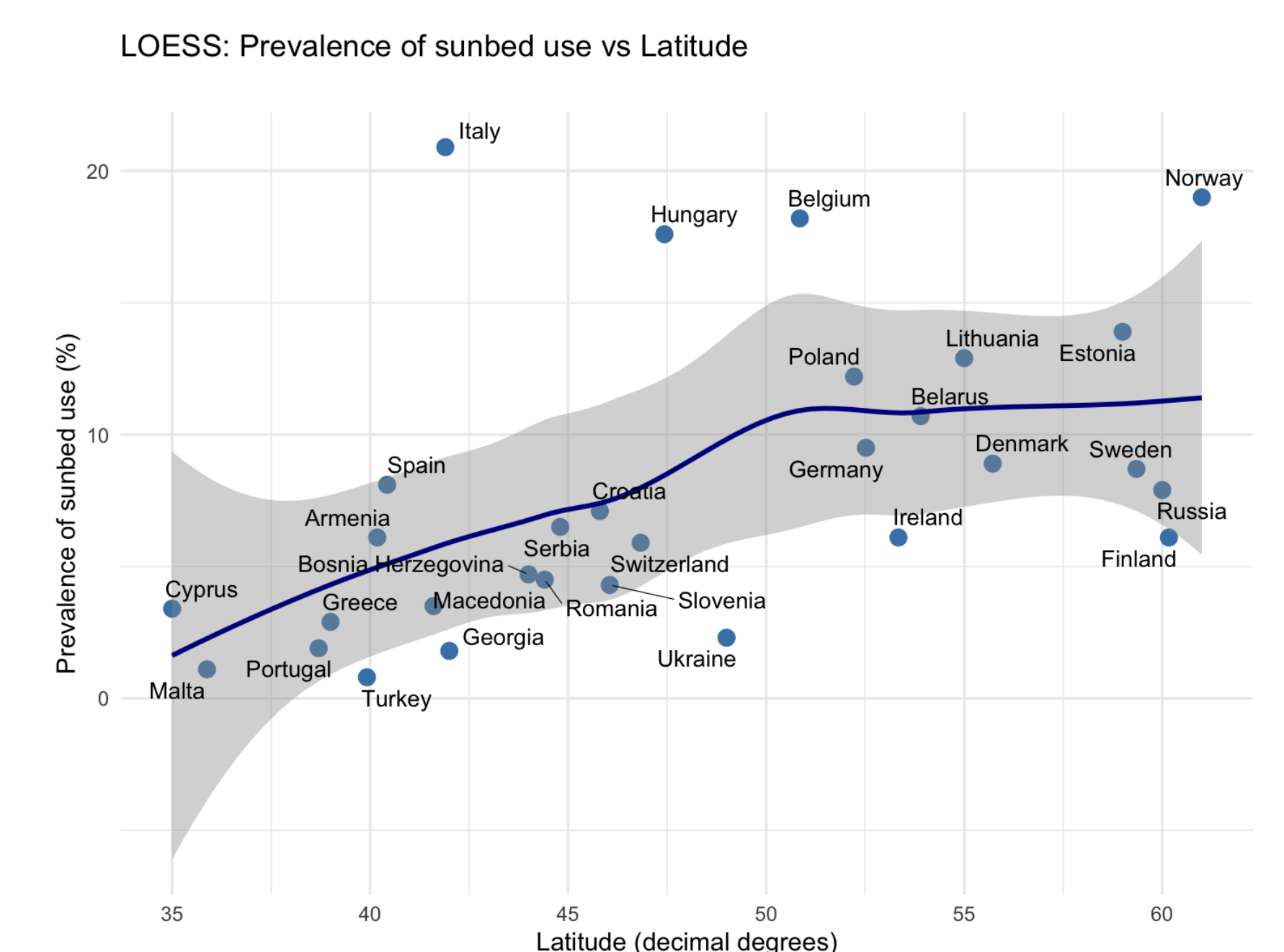


Figure 4. Association between capital city latitude and sunbed use prevalence.

## Discussion

- Indoor tanning remains common despite known carcinogenic risks.
- Prevalence is driven more by **cultural** than geographic factors.
- Declining trend post-2009 may reflect awareness campaigns and regulation.
- Higher use among young women and skin types III–IV suggests **aesthetic motivation**.

**Limitations:** self-reported exposure; opportunistic sampling; heterogeneous country participation across years.

Prevention strategies should target cultural and behavioural drivers of indoor tanning, not only environmental exposure.

## Conclusions

1. Indoor tanning prevalence **more than halved** between 2009 and 2018, with substantial between-country heterogeneity.
2. Main users were **women** (OR = 2.99) and **young adults aged 20–35** (OR = 2.50), with higher prevalence in **northern, high-latitude countries**.
3. Sunbed use is shaped more by **behavioural and cultural factors**, than by environmental exposure alone.
4. Despite the declining trend, indoor tanning remains a **preventable risk factor**.
5. The **Euromelanoma platform** provides a valuable and unique tool for monitoring UV-related behaviours at the European level.

**☛ Indoor tanning is declining in Europe but remains driven by behavioural and cultural factors. Prevention should target women and young adults in northern countries.**