

Uncovering direct influences on the intention to use long-acting injectable PrEP among MSM to support its upcoming rollout across Europe: A systematic review of reviews and a Bayesian network analysis

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Background

The HIV prevention landscape is rapidly evolving with the emergence of long-acting-injectable PrEP (LA-PrEP). Yet, understanding its potential impact requires rethinking beyond traditional determinant models towards a more dynamic, systems-based approach. This study integrates global evidence with probabilistic modelling to improve our understanding of how interconnected factors shape LA-PrEP intention among men-who-have-sex-with-men (MSM) in Europe, supporting implementation efforts to facilitate equitable PrEP implementation and rollout.

Study objectives

Our objectives were twofold:
1), to synthesise global evidence on determinants of HIV biomedical prevention intention and uptake; and
2), to identify, through a data-driven probabilistic model, the key factors that directly influence intention to use LA-PrEP among MSM in Europe.

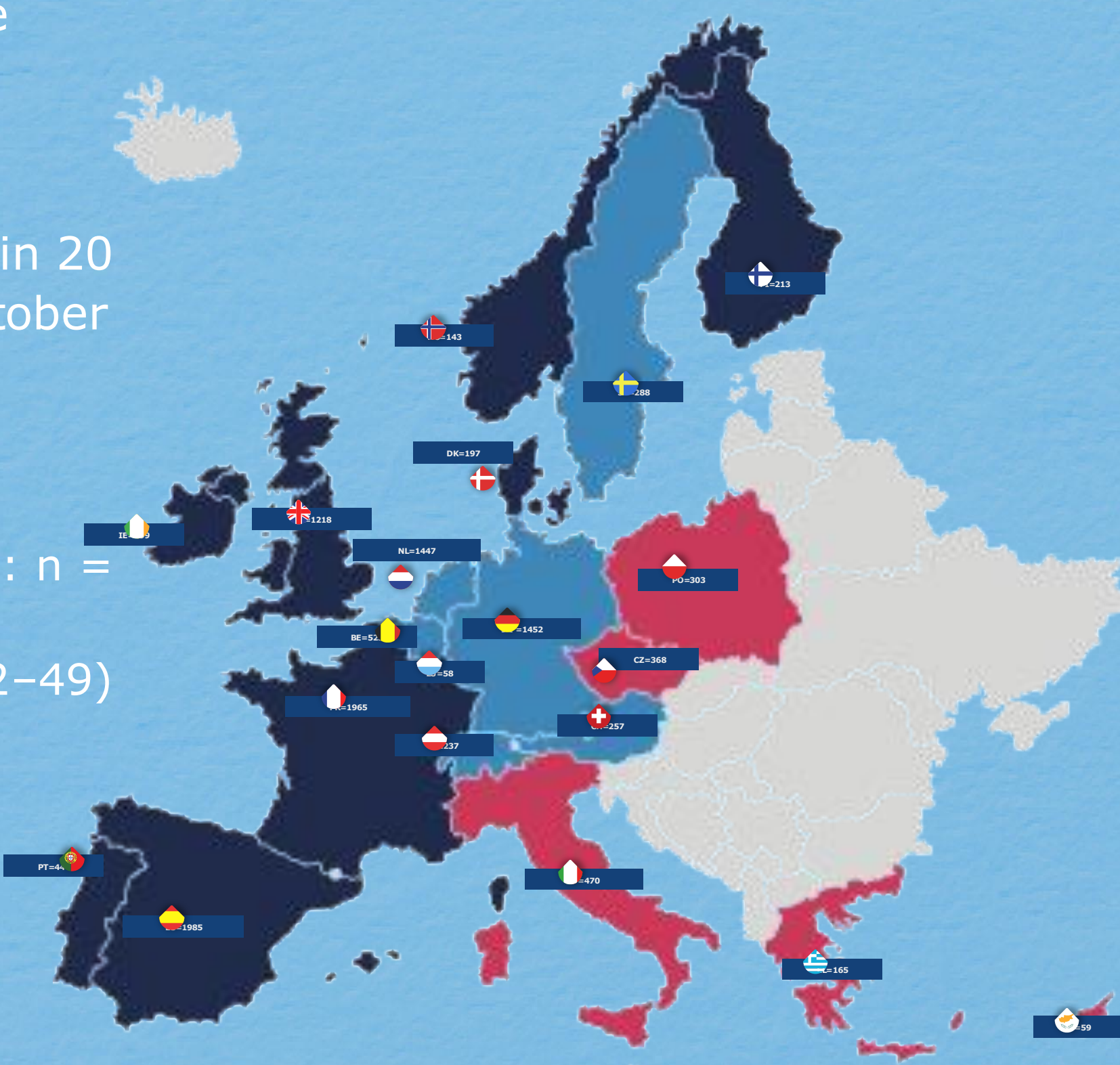
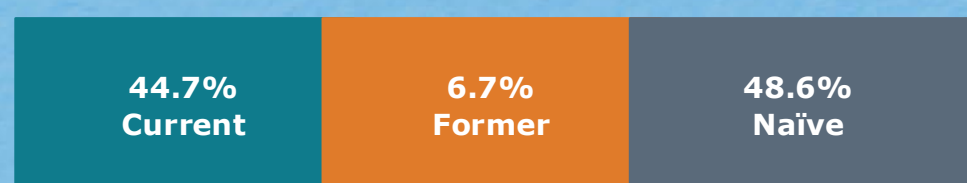
The European PROTECT Survey

The understanding Pre-exposure prophylaxis modalities for HIV prevention in the European Communities (PROTECT) cross-sectional survey was conducted in 20 European countries between October 2023 and April 2024

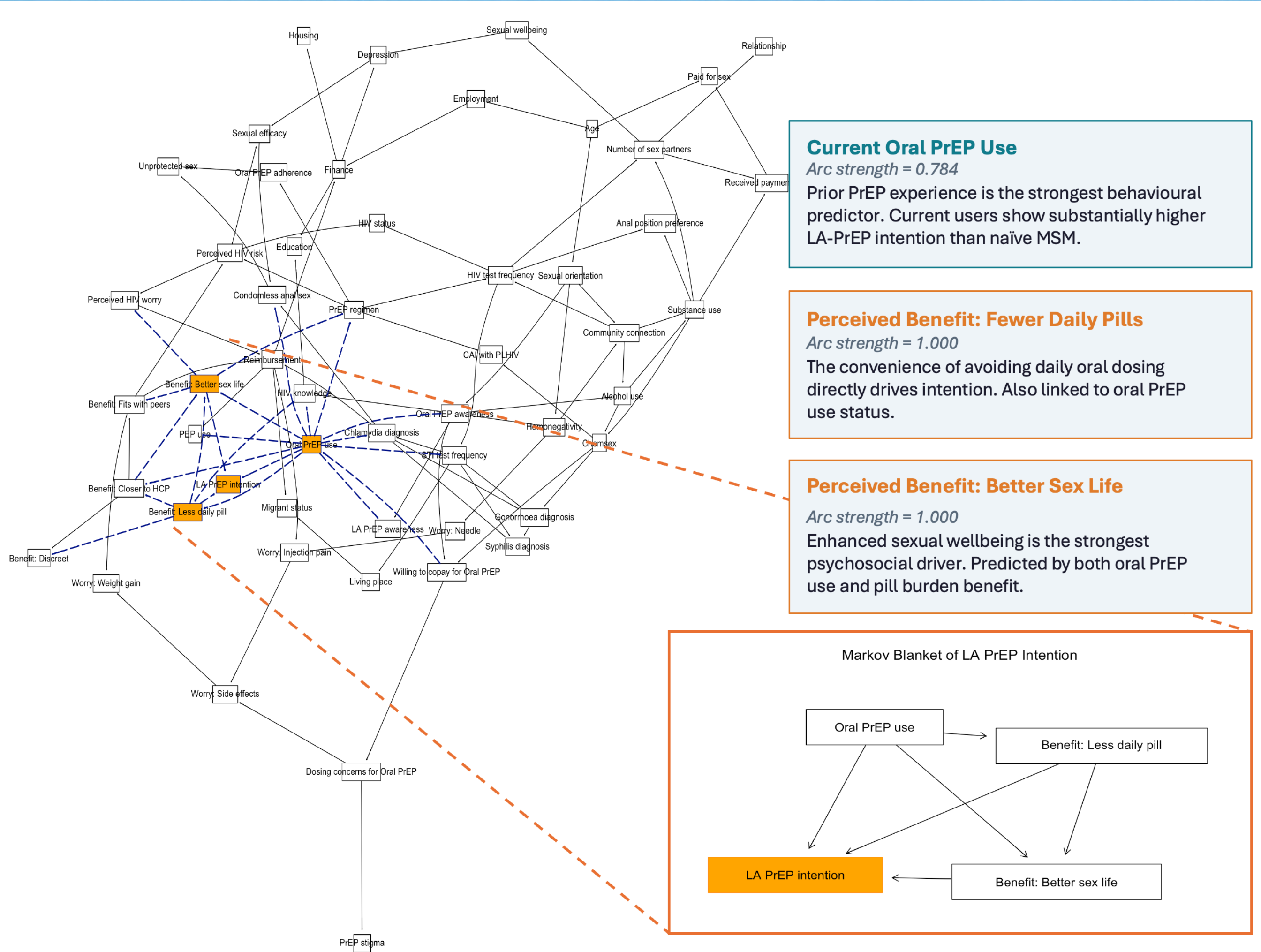
For this analysis:

- All HIV-negative MSM included: n = 14,322
- Median age: 40 years (IQR: 32–49)

Current oral PrEP status:



Full Bayesian Network and Markov Blanket of LA-PrEP Intention



Conditional Probabilities

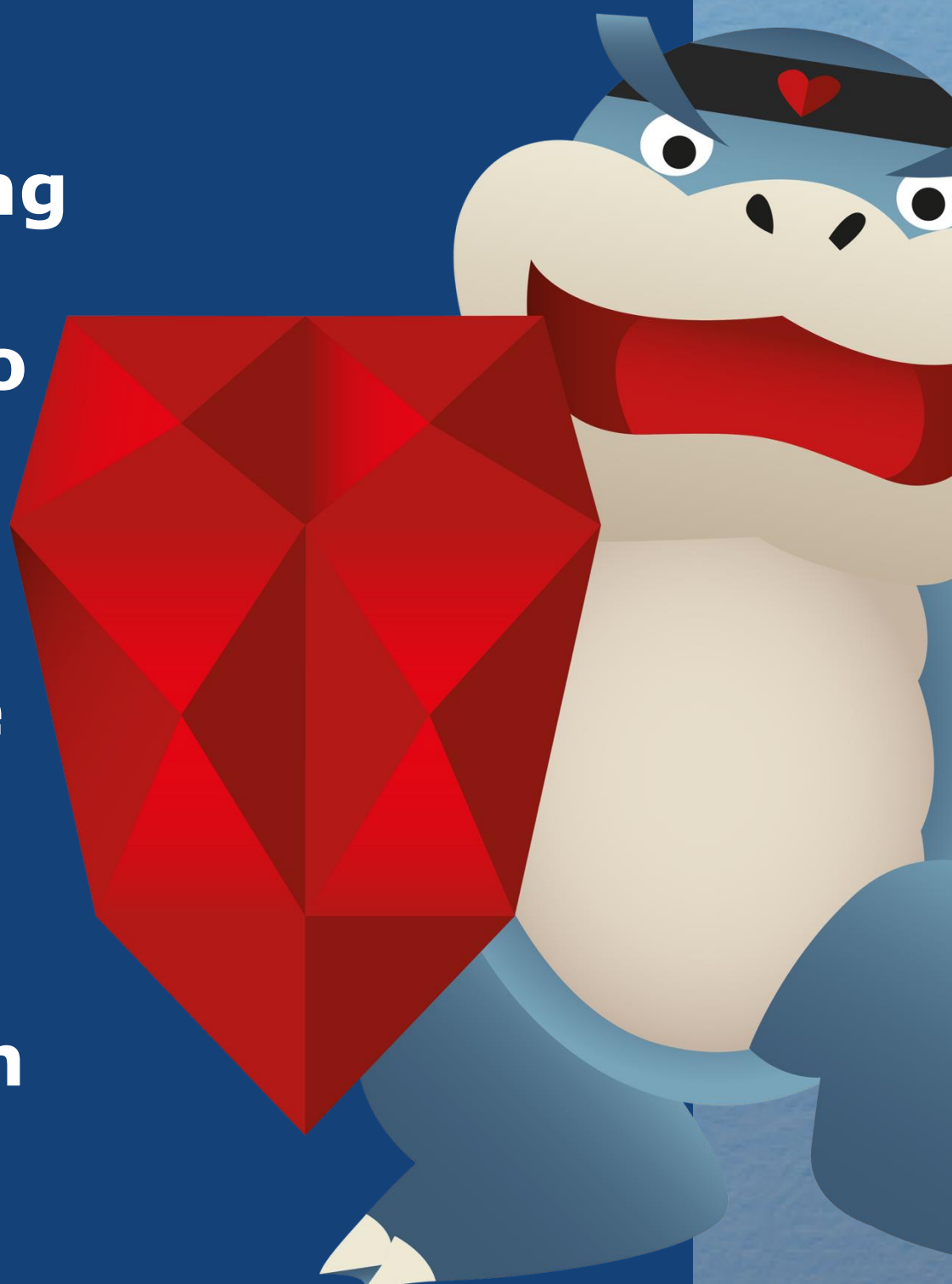
Oral PrEP Status	Benefit: Fewer Pills	Benefit: Better Sex Life	PCP	95% CrI	Oral PrEP Status	Benefit: Fewer Pills	Benefit: Better Sex Life	PCP	95% CrI
Former	Low	High	0.923	0.899–0.921	Former	Moderate	Low	0.182	0.056–0.485
Current	High	High	0.910	0.857–0.907	Naïve	Low	Moderate	0.147	0.090–0.233
Former	High	High	0.884	0.662–0.982	Naïve	Moderate	Low	0.134	0.091–0.194
Current	Moderate	High	0.807	0.684–0.889	Naïve	Low	Low	0.128	0.094–0.171

Perceived sexual benefit (better sex life) is the dominant driver.

PrEP-naïve MSM with low perceived benefits face the highest adoption barrier.

Take home messages

- LA-PrEP intention among European MSM is shaped primarily by perceived sexual benefit, convenience, and prior oral PrEP experience — not by sociodemographics or HIV risk behaviour
- Perceived sexual benefit exerts a stronger and more direct influence than regimen convenience, particularly among PrEP-naïve individuals
- The main near-term appeal of LA-PrEP lies in retaining and re-engaging current/former PrEP users, not automatically expanding coverage to PrEP-naïve MSM
- Oral PrEP services are foundational: strengthening them is crucial before and alongside LA-PrEP rollout
- The BN framework offers a scalable, dynamic, and interpretable approach for modelling HIV prevention behaviour across diverse outcomes



Methods: Two-Step Methodological Design

Step 1: Systematic Review of Reviews

- Searched PubMed, Web of Science, Scopus, Embase
- Studies published before October 2025
- PIO search terms: MSM, PrEP/PEP/TasP, determinants
- Eligible: narrative or meta-analytic reviews
- Quality: AMSTAR-2 checklist
- Separate MSM analyses required if other populations included
- Pre-registered in PROSPERO (CRD42024577519)

informs variable selection

Step 2: Bayesian Network Analysis

- Hill-Climbing algorithm with BIC scoring
- 3 structural constraints for logical consistency
- Bootstrap validation: 1,000 resamples
- Arcs with strength >0.70 retained (stable)
- Markov blanket analysis: identify direct causes of LA-PrEP intention (parent nodes)
- Conditional Probability Tables (CPTs): MLE + Dirichlet resampling (n=10,000)

59 Determinants of HIV Biomedical Prevention

Individual Socio-demographic	Individual Psychosocial & Behavioural	Interpersonal	Structural & Societal
- Age - Education - Employment - Financial status - Housing - Migrant status - Relationship status - Sexual orientation - Living place	- Perceived benefits - Perceived concerns/barriers - HIV/PrEP knowledge - Perceived risk/concern - PrEP adherence challenges - Chemsex/substance use - Condomless anal sex - STI/HIV testing & diagnosis - Oral PrEP use & regimen	- Partner/peer/family approval for PrEP - History of abuse - Knowing someone with HIV/on PrEP - Partner HIV status - Sexual network variables - Group sex	- MSM/HIV/PrEP stigma - Healthcare access & cost - PrEP eligibility policies - Gay dating app use - Country-level policies - Provider–patient relationship

59 determinants identified in the review → 39 available in PROTECT → 54 variables entered the Bayesian Network

Structural Constraints — Encoding Real-World Logic

Demographic characteristics cannot have parent nodes

Socioeconomic variables can only be influenced by demographics

LA-PrEP intention cannot be a parent node



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