Silicone wristbands and wide-scope analysis: a novel approach to unveil children's personal chemical exposome

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on behalf of the ECHOES and OnBREATHE project researchers

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BACKGROUND

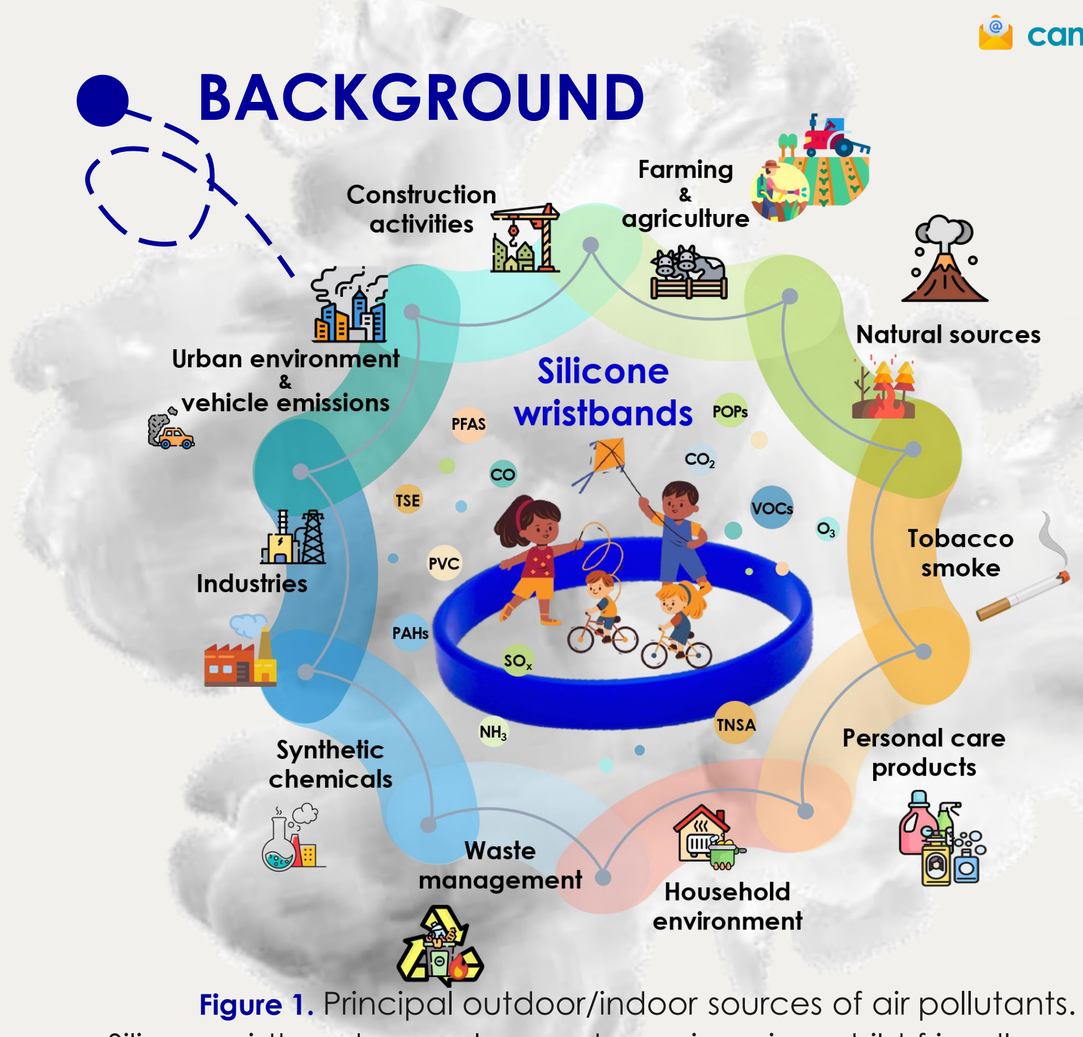


Figure 1. Principal outdoor/indoor sources of air pollutants. Silicon wristbands are a low-cost, non-invasive, child-friendly personal passive sampling device to capture environmental pollutants.

- **Air pollution** is a **leading** environmental **health risk** factor all over the world, especially for vulnerable populations (children).
- The **continuous exposure** to environmental pollutants induces genomic and **metabolic** changes, impacting the development of children.
- The **early-life exposure** can **uniquely cause** long-term **chronic health outcomes**, whose effects are still underestimated.

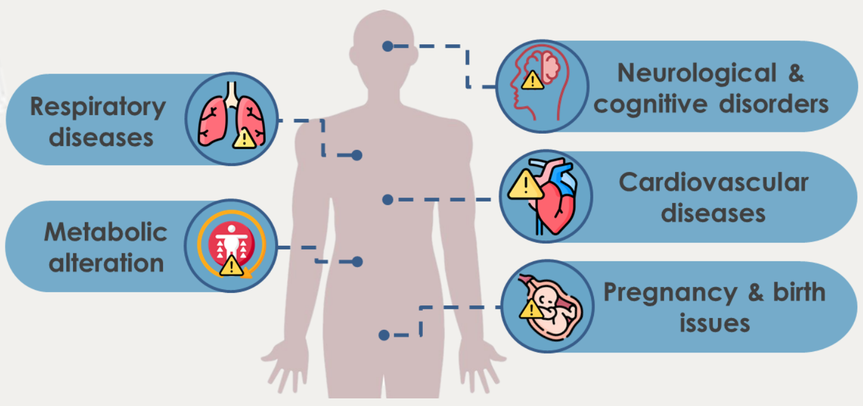


Figure 2. Main later-in-life chronic health outcomes associated with early-life exposures.

OBJECTIVE

To develop a **wide-scope analytical strategy** to comprehensively **characterise** the chemical **exposome of children** on a large scale **using silicone wristbands** (WBs)

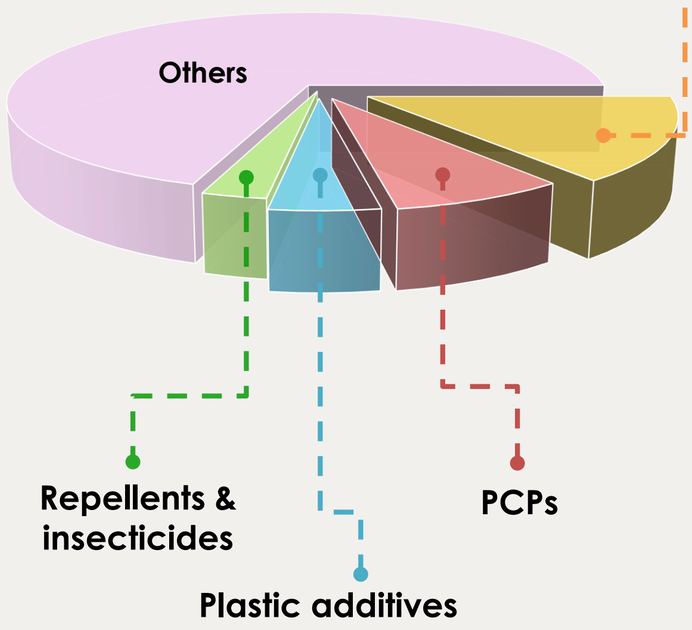
APPLICATION

the **largest petrochemical site** in Southern Europe

8 - 12 y.o. **(n=218)**

Smokers' & Non-Smokers' Homes

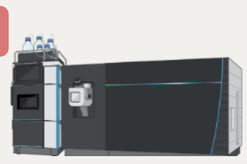
634 indoor/outdoor pollutants (endocrine disruptors and carcinogens) detected in WBs



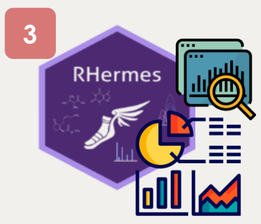
Wide-scope suspect screening analysis

1. Silicon wristband extraction

2. Liquid chromatographic analysis



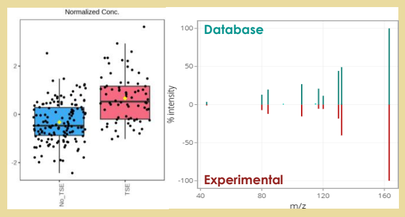
3. ♦ **Chemical identification**
♦ **Statistical analysis**



Scheme 1. Cohort design & sample collection. Formula-oriented wide-scope suspect screening workflow for exposome studies.

Tobacco-related compounds

Nicotine



Myosmine

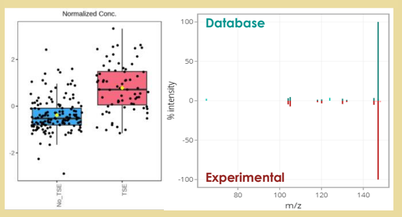
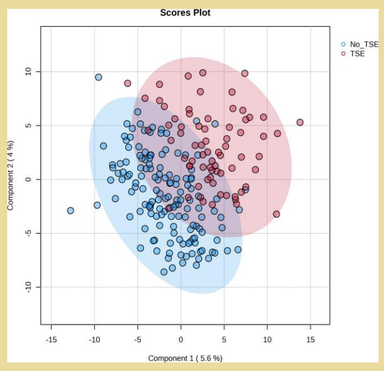


Figure 3. Box plots of the distribution of the two influential features between exposed and non-exposed children to tobacco smoke (TSE) and their mass spectrum.



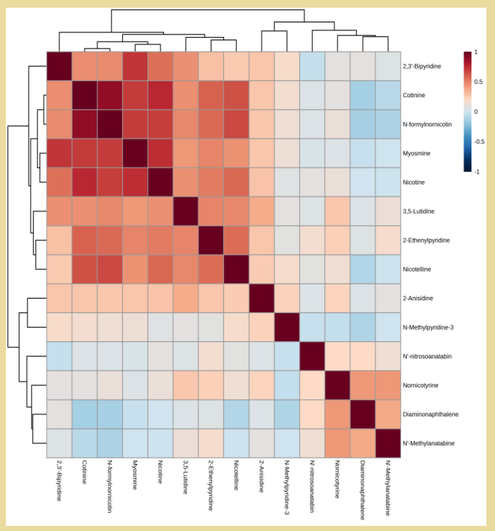


Figure 4. PLS-DA score plot representing the exposed and non-exposed children to TSE (left) and correlation heatmap of the annotated TSE compounds (right)

- Tobacco-related compounds, as case study, were found in 80% of the participants contrary to the reported 36% directly exposed at home
- The preliminary results confirm the **ubiquity of air pollution** and highlight the **necessity of future political decisions** to minimize the exposure of vulnerable populations and health outcomes

AKNOWLEDGMENTS

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