PANEL “De los determinantes sociales de la salud cerebral a la construcción comunitaria de la salud biopsicosocial desde los territorios”

Unveiling the Mechanisms and Fundamentals Behind the Human Mind and its disorders

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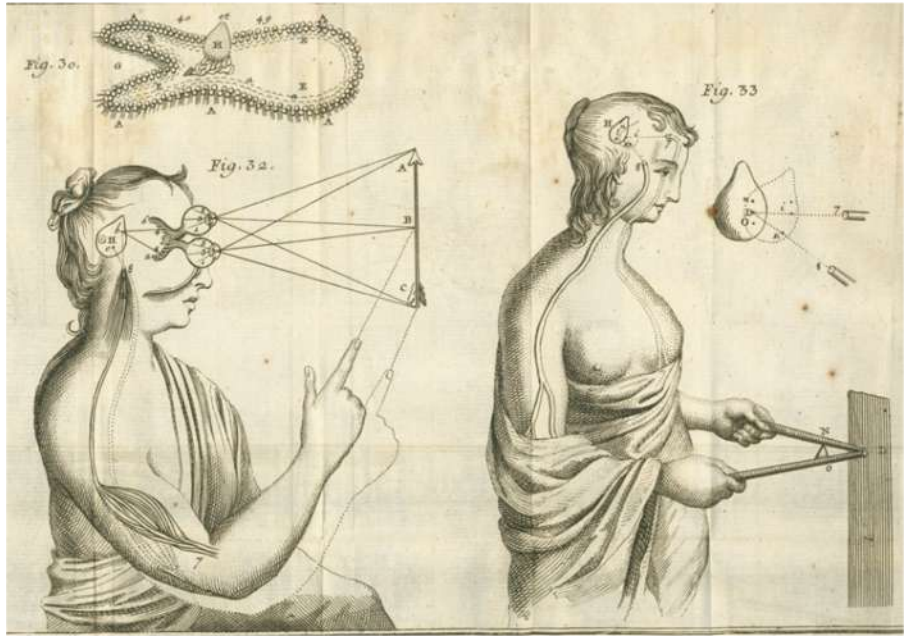
PhD Program of Neuroscience
Universidad Javeriana

Our model of human mind and behavior science

Unveiling the Mechanisms and Fundamentals Behind the Human Mind and its disorders

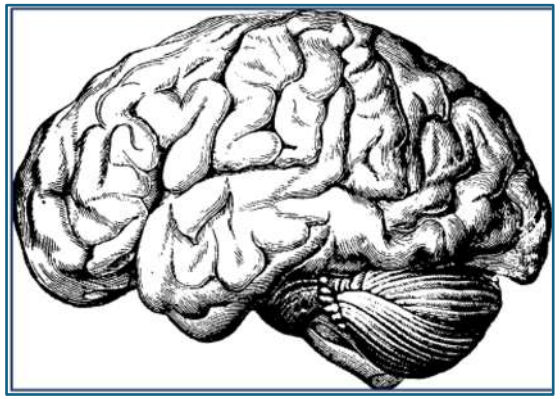


René Descartes, 1640

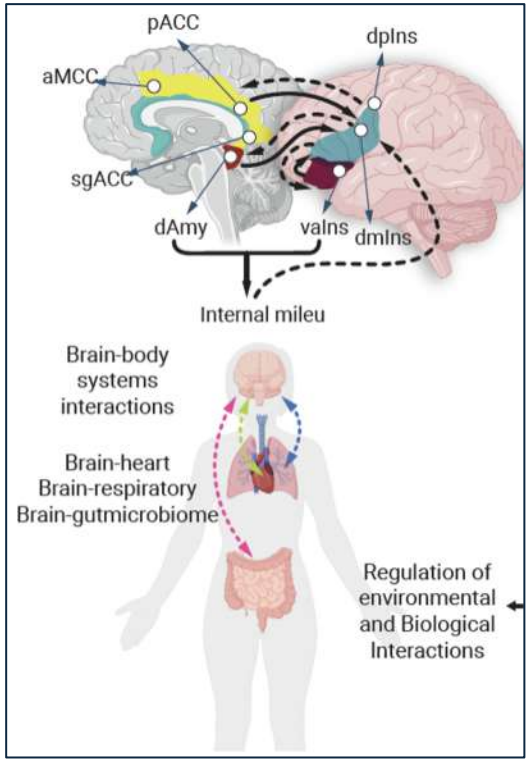
Mind and brain (body) has differential properties, fundamentals and outcomes

Robert Fludd, 1620

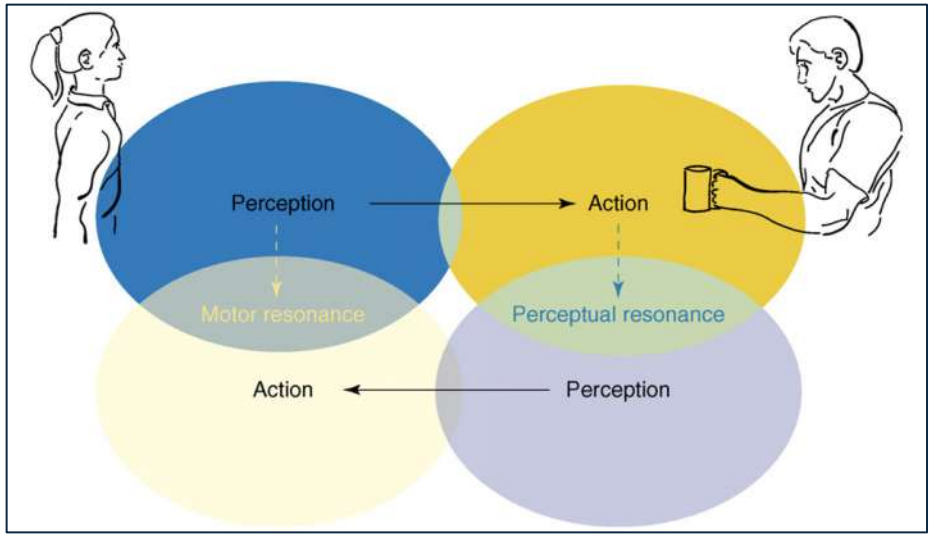
Unveiling the Mechanisms and Fundamentals Behind the Human Mind and its disorders (our approach)

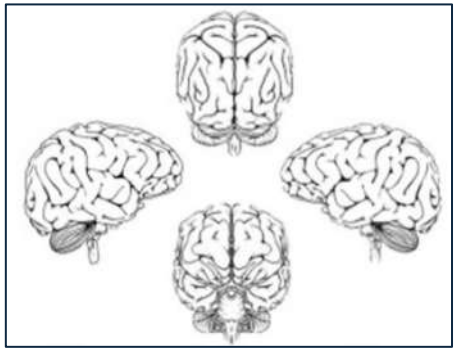


Studying brains
structures
and functions



Studying brain and
body
Biology interactions



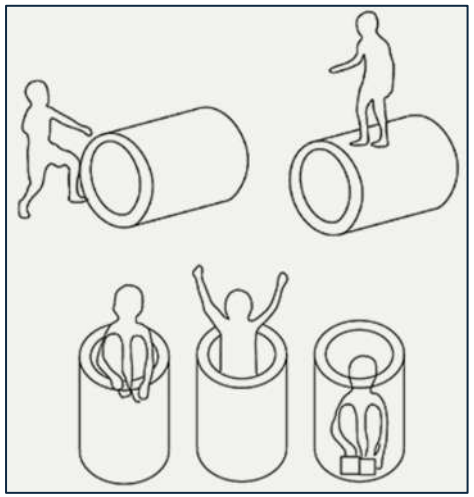


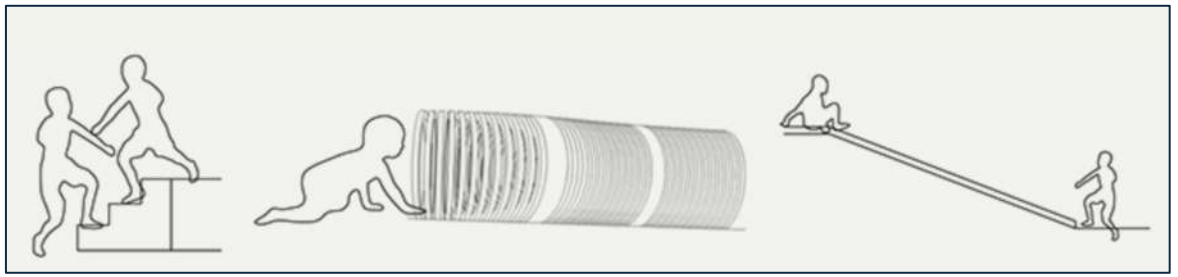
Studying brain and human behaviors in situated manner:
Under complex interactions

Santamaría-García H. Computational whole-body-exposome models for global precision brain health. Nature Com. 2025

Human mind depends on movement and interactions with space

Thorncrown Chapel. Fay Jones
”a place to rest, reflect, and refresh ”



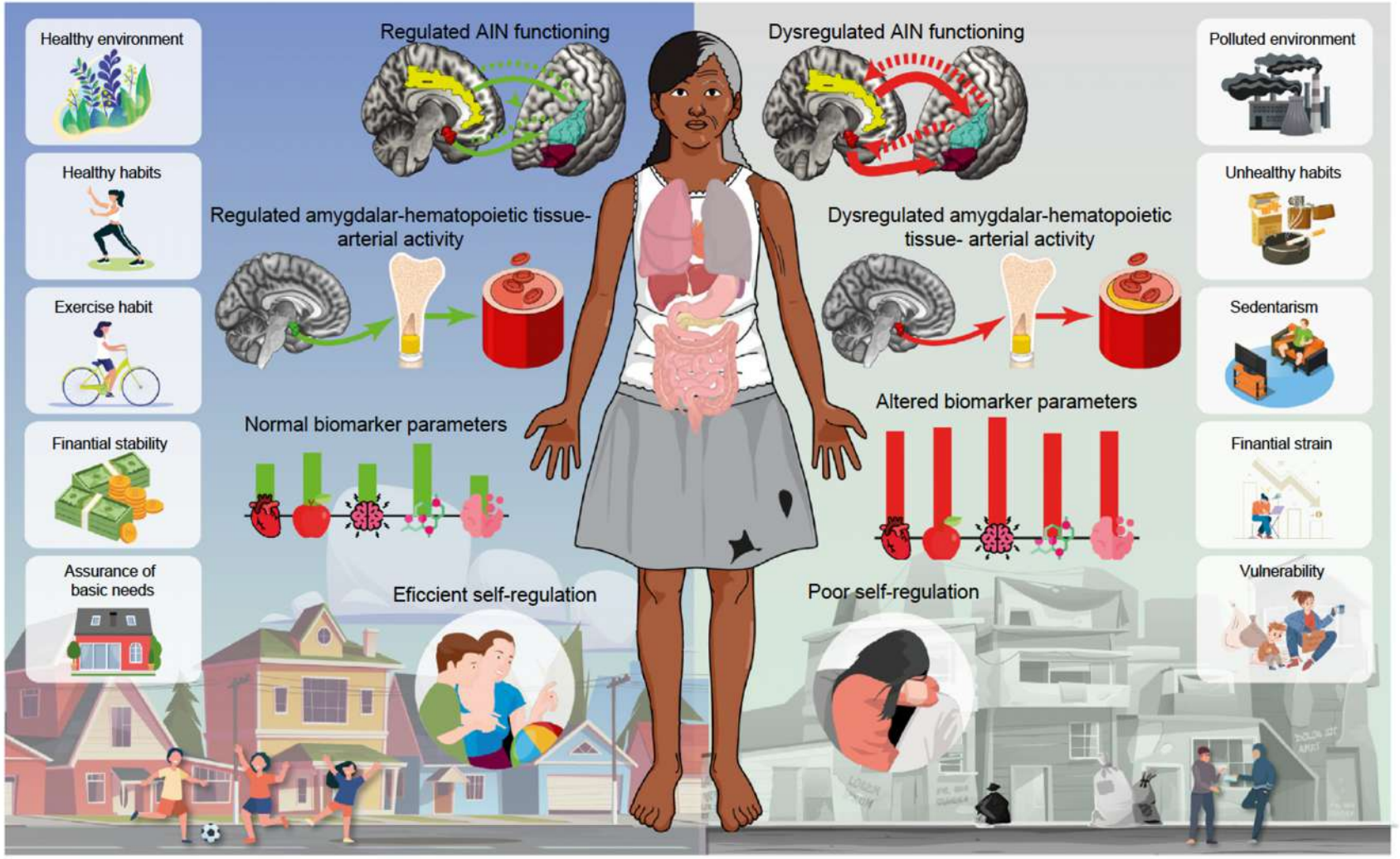


Human mind experiences are shaped by
Interactions with context

Spaces affordances shape mental
Experiences and behaviors

The End of Sitting. RAAAF [Rietveld Architecture-Art Affordances] & Barbara Visser

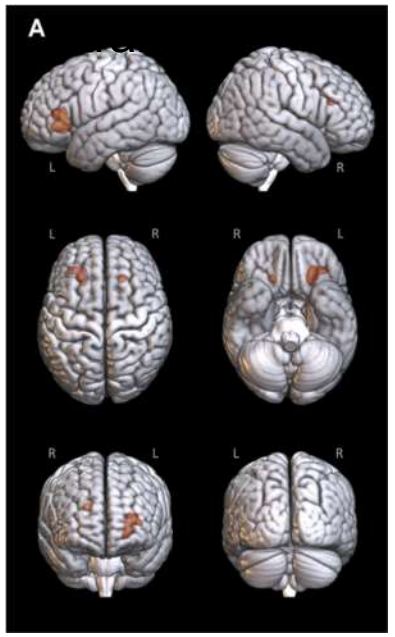
Human mind is also sculpted by cummulative exposure to different physical and social environments



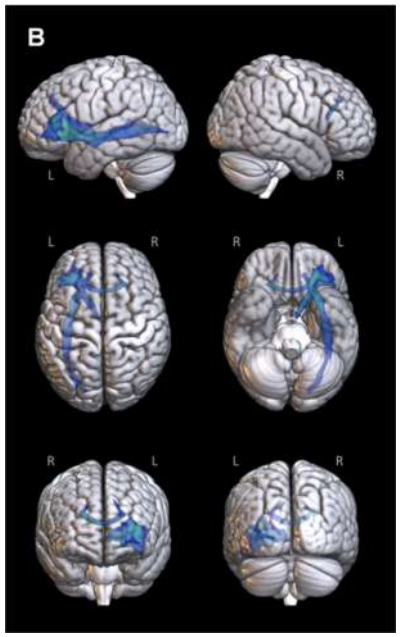
Santamaria-Garcia et al, 2024. Allostatic Interoceptive Overload Across Psychiatric and Neurological Conditions. Biological Psychiatry

Human mind is also sculpted by cultures

Pre-

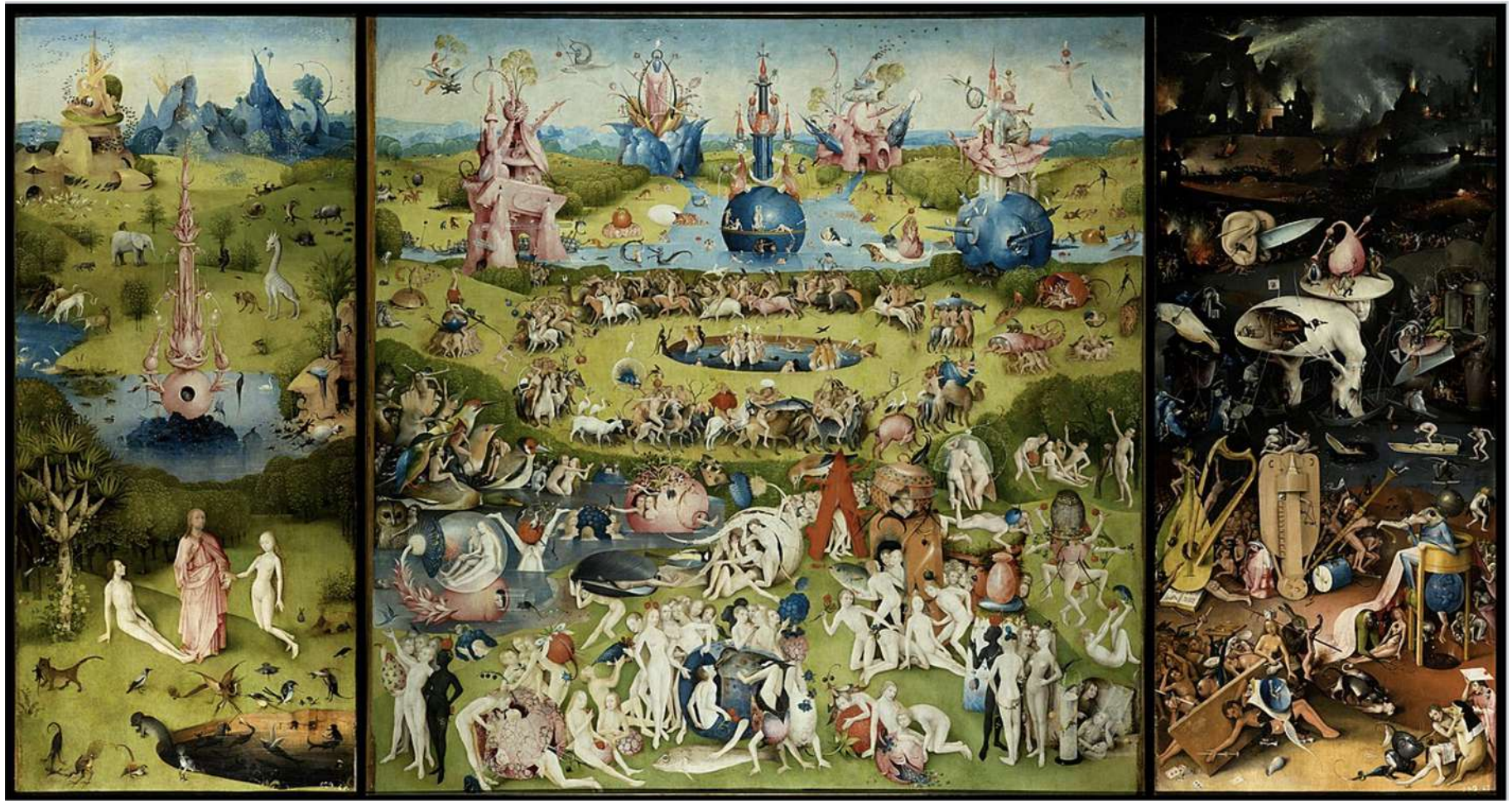


Post-



Santamaría-García H. Functional neurological disorders as a pivot disorder for understanding bayesian psychiatry. Submitted 2025

Brain-body-context-culture interactions will offer better options for understanding human mind (subjectivity) complexities



Santamaría-García H. Functional neurological disorders as a pivot disorder for understanding bayesian psychiatry. Submitted 2025

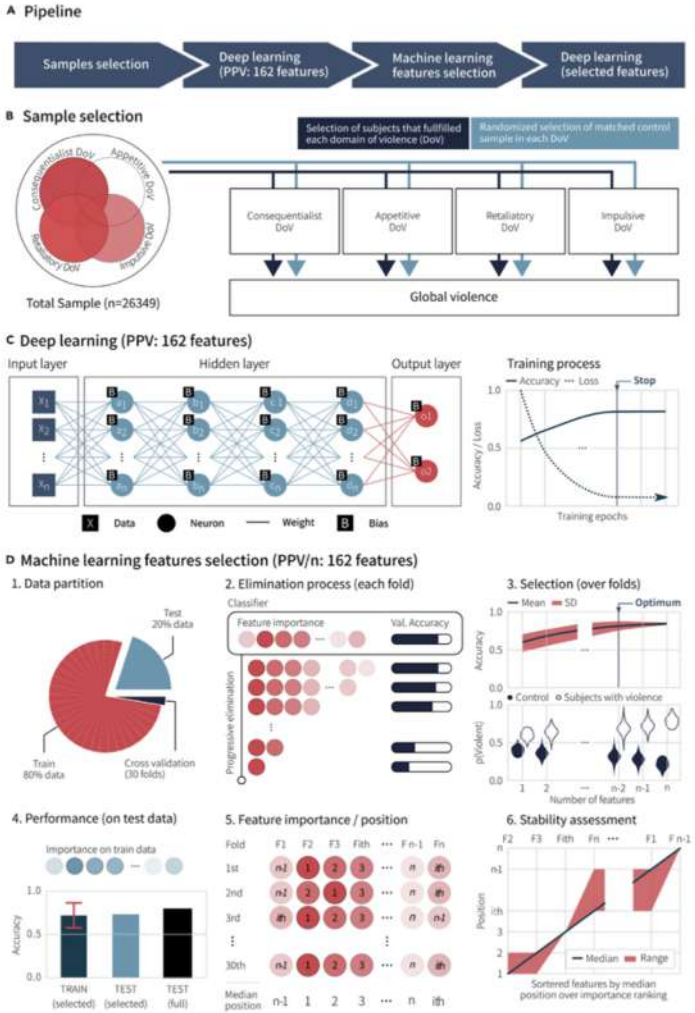
How do individual and social factors relate to violent behavior?

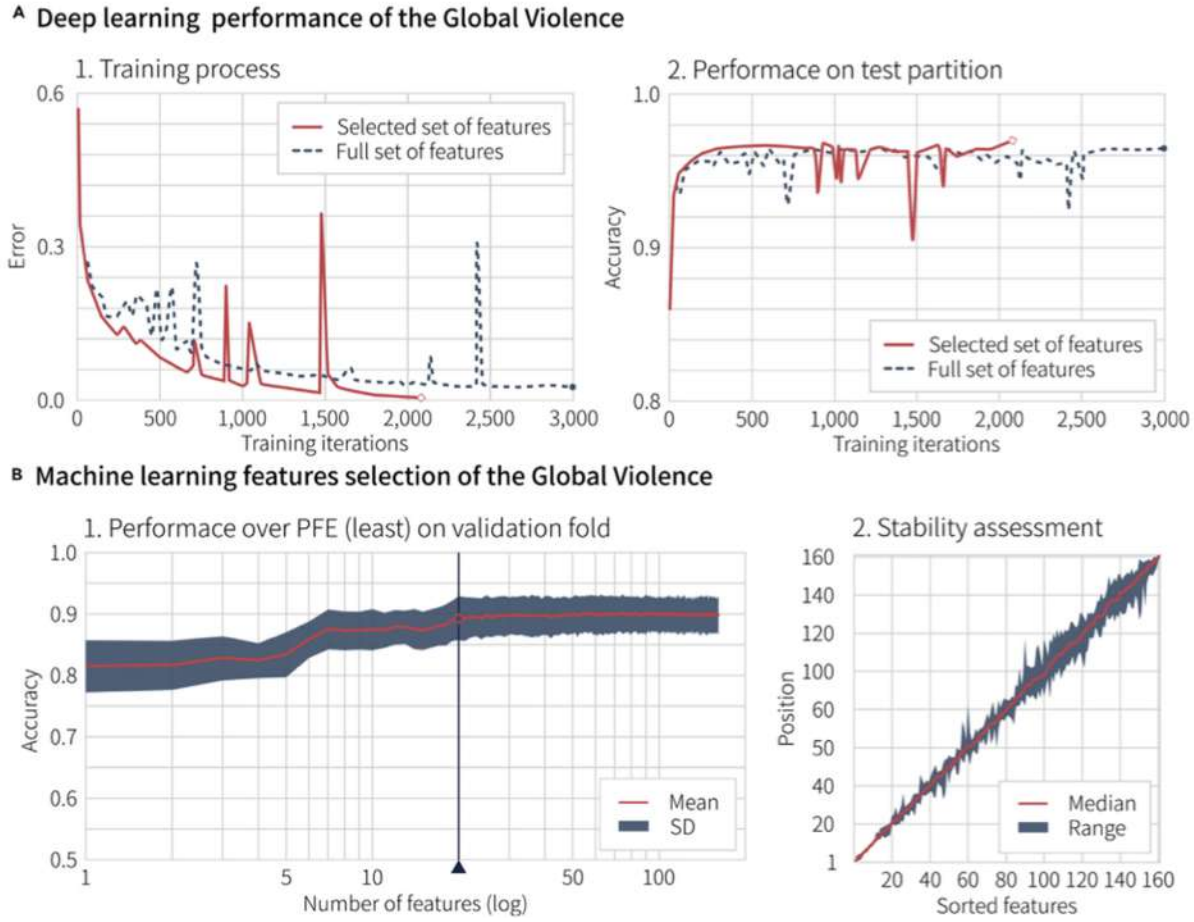
Factors associated with violence behavior in ex-members of armed groups in Colombia

The Hobbes–Rousseau dilemma of human nature

Hobbes: humans are naturally selfish and violent; they need a strong state.

Rousseau: humans are basically good, and it is society that corrupts them.





Santamaría García et al Patterns Cell 2020

Critical finding: Social factors are more relevant predictors than psychological factors in predicting violence

Factors associated with violence behavior in ex-members of armed groups in Colombia

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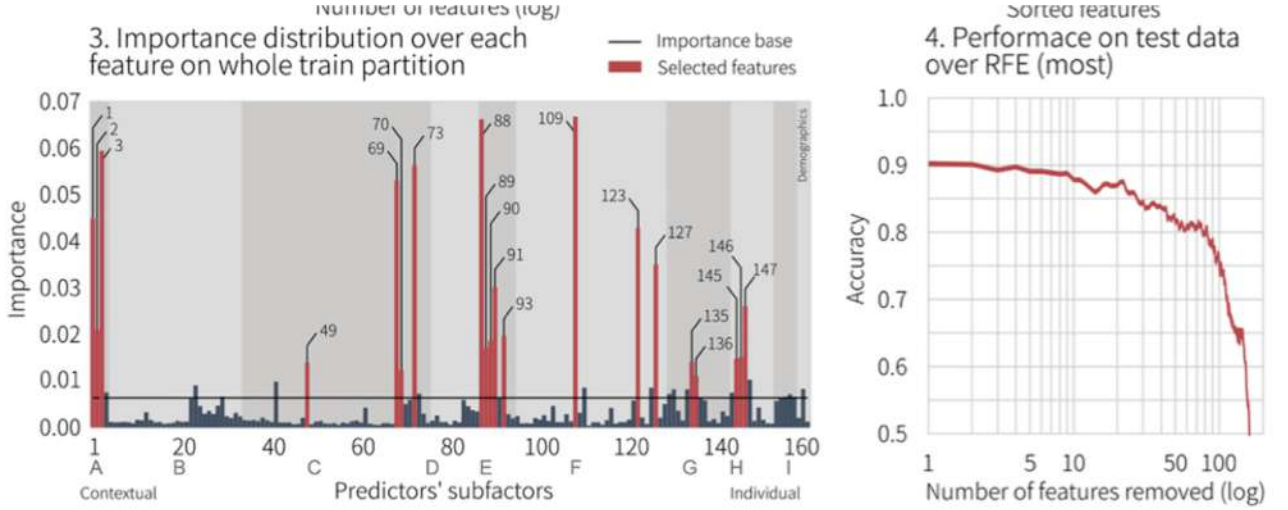
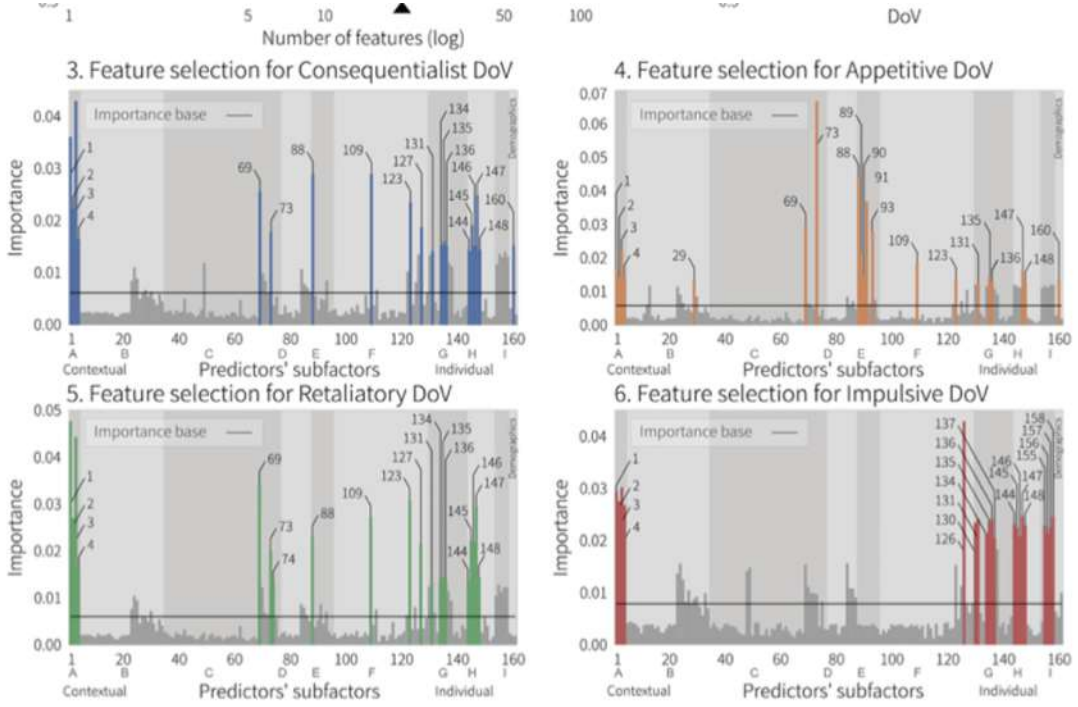


A. Mean Contextual Predictors, B. Social Network Adversities, C. Social Vulnerability, D. Political Context, E. Membership Identification, F. Normalization of Violence, G. Mental Symptoms H. Personality Traits, I. Protective Aspects.



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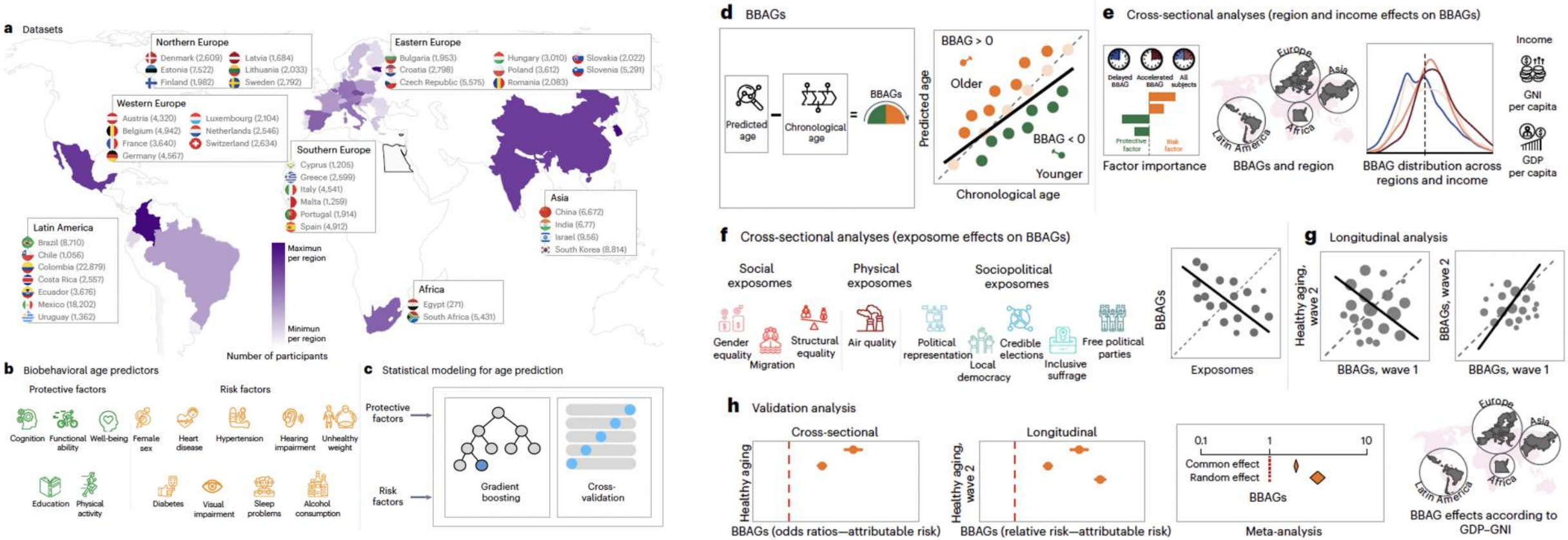
Santamaría García et al Patterns Cell 2020

Critical finding: Social factors are more relevant predictors than psychological factors in predicting violence

Multimodal exposomes and aging

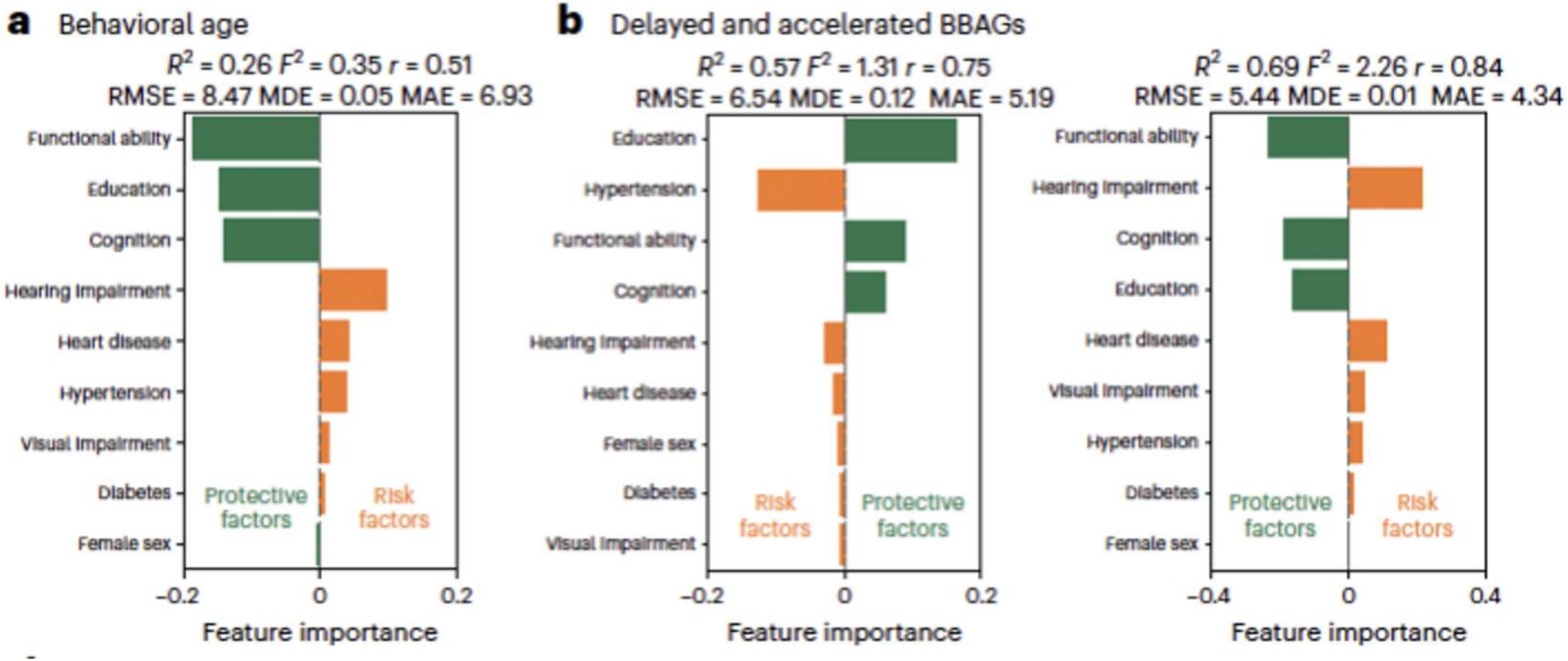
Methods



Hernandez H and Santamaría García et al Nature Medicine 2023

Results

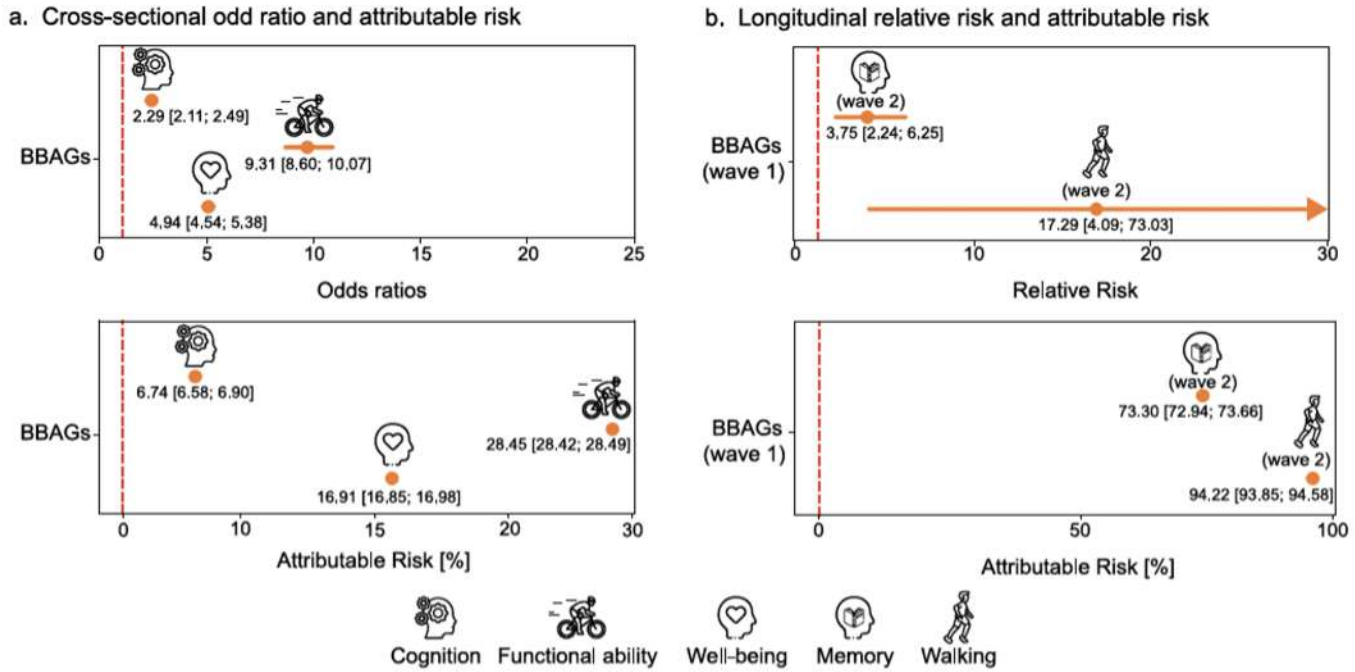
Is it possible to predict chronological age by using biological (age, perceptual skills), behavioral (lifestyles) and social factors (education, SES)

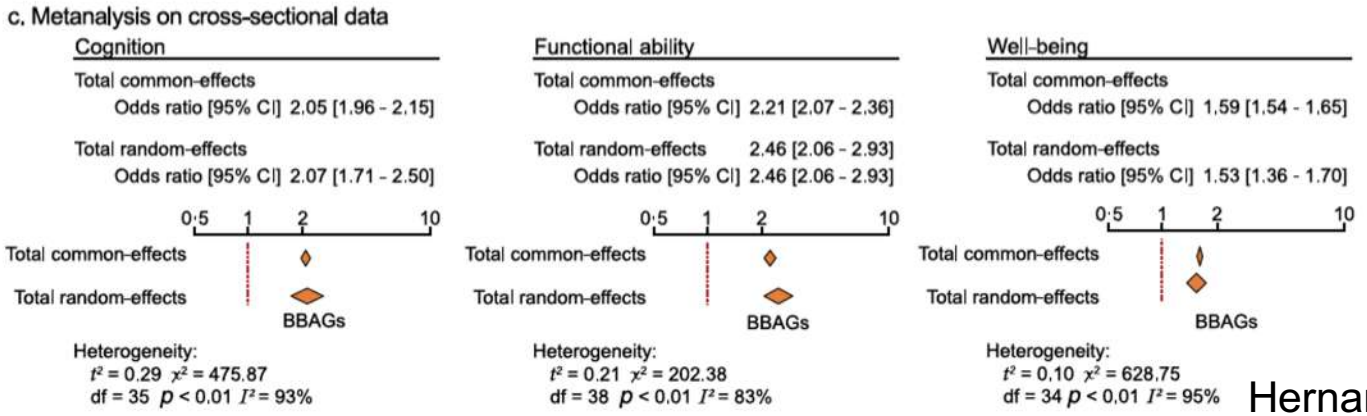


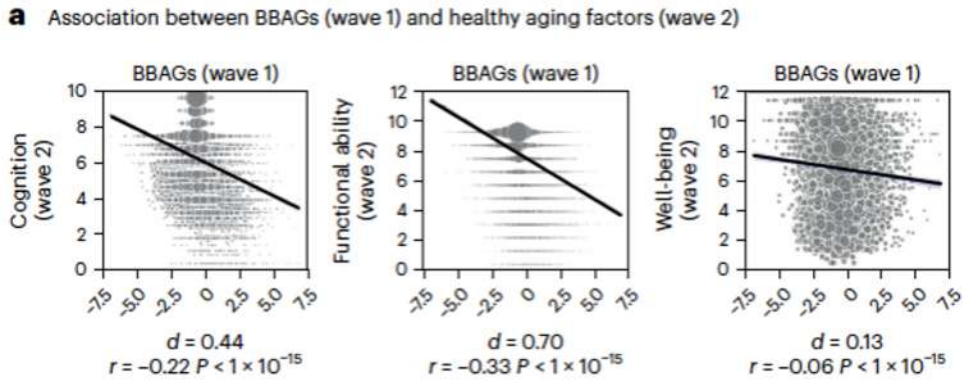
Hernandez H and Santamaría García et al Nature Medicine 2025

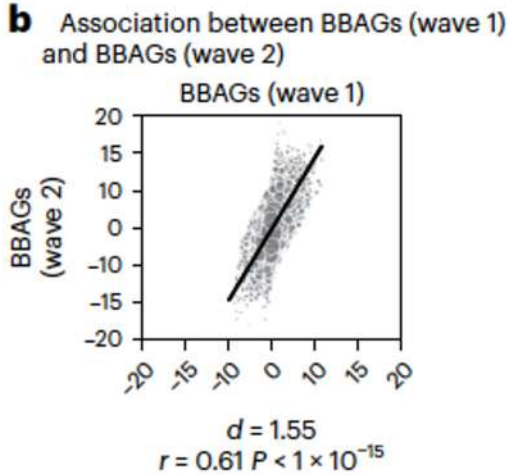
Results

Bio-behavioral clocks predict cognition, functionality, and mental wellbeing cross-sectionally and prospectively.





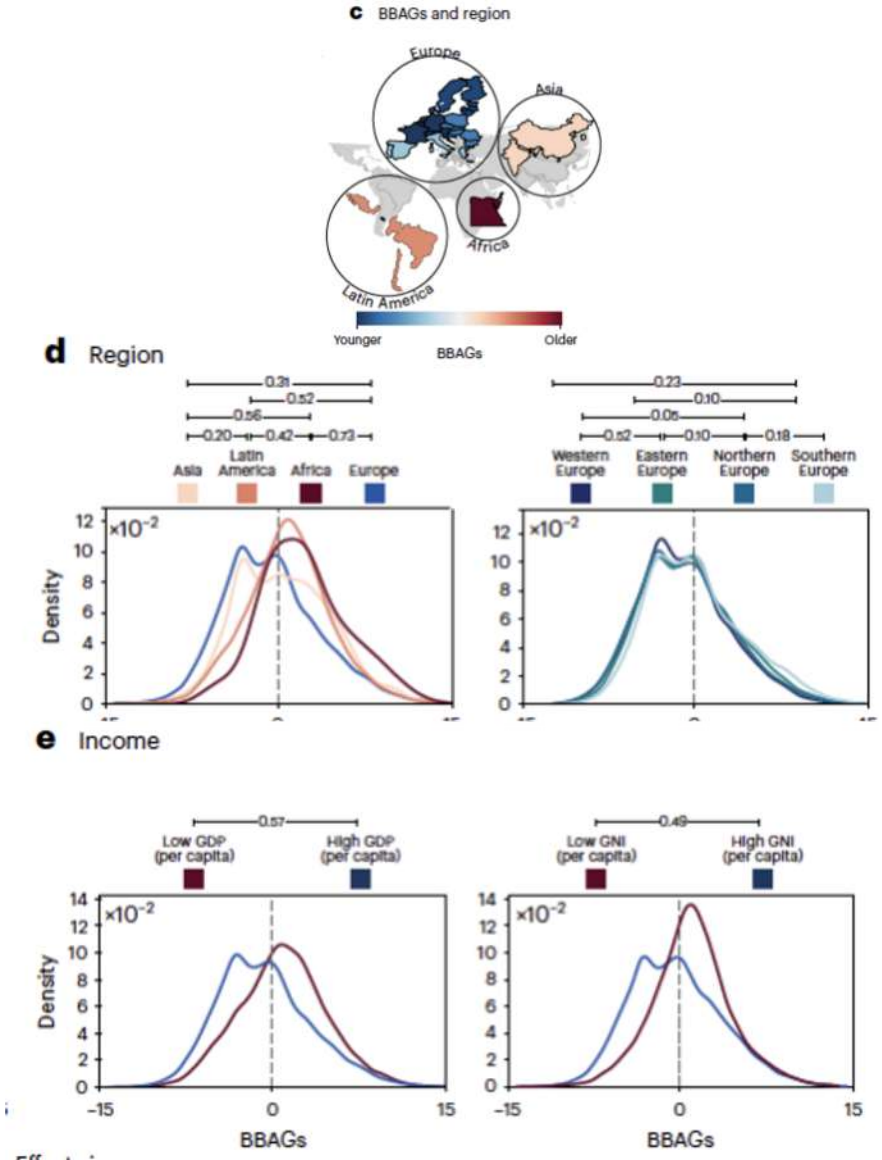


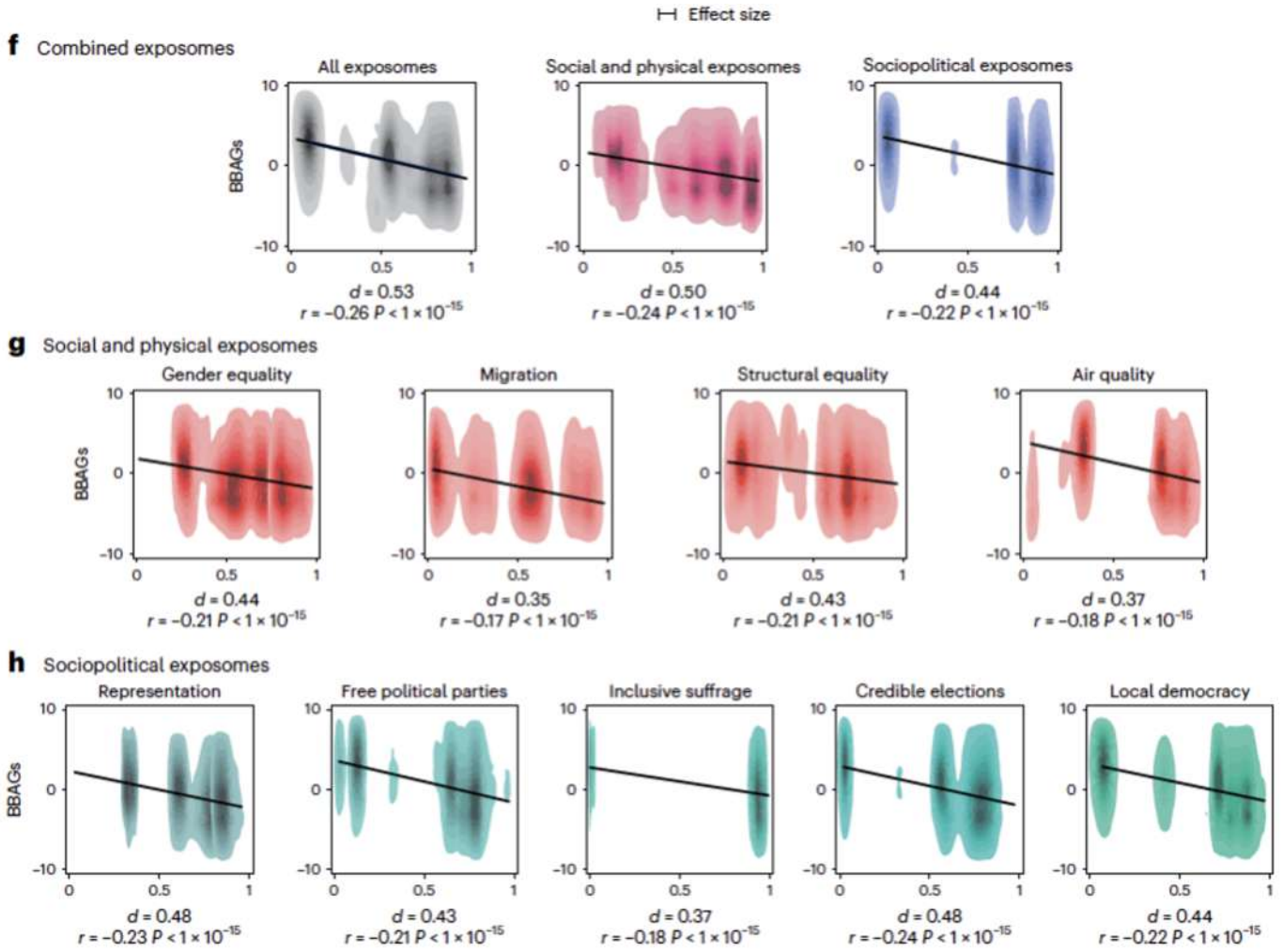


Hernandez H and Santamaría García et al Nature Medicine 2025

Results

Biobehavioral clocks are affected by income factors of countries.





Biobehavioral clocks are affected by environmental (air pollution), social

(inequity, disparities) and democratic exposomes (political factors)

Hernandez H and Santamaría García et al Nature Medicine 2025

Societal values, mind life and aging

Societal values and mental wellbeing and aging

Societal values (notions of collective wellbeing, social cohesion, perceived agency, and institutional trust) organize community life and have been linked to: better health profiles, lower mortality, reduced physiological stress and better coping, stronger social networks and healthier behaviors, longer life expectancy, and more equitable health systems.

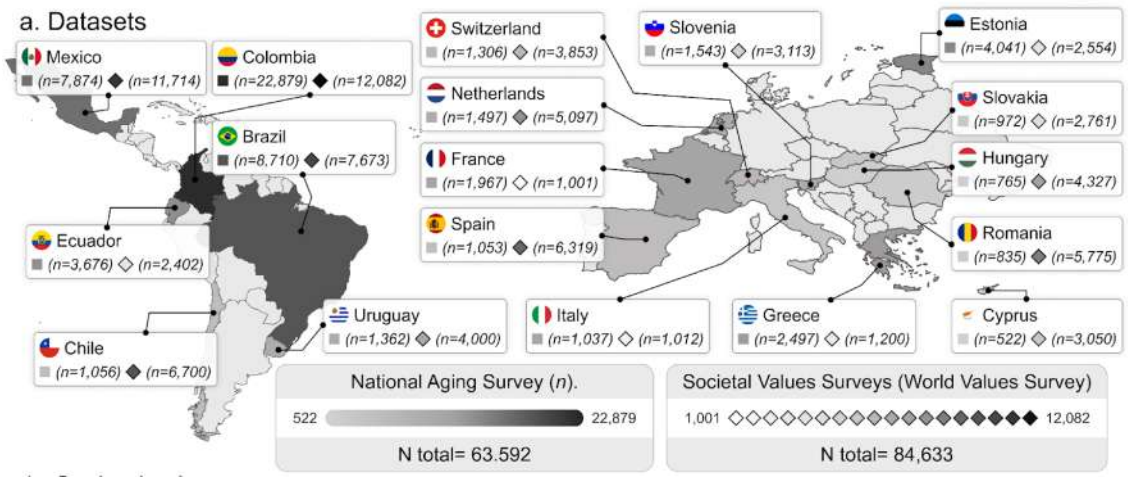
But could they also impact individual and population-level aging processes?

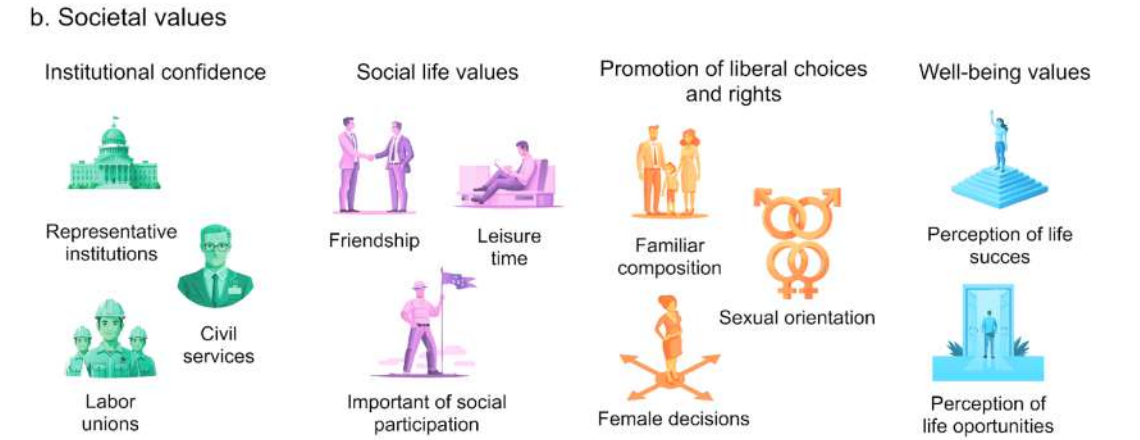
Santamaría García et al Social values related inform healthy and accelerated aging. Under preparation. 2025

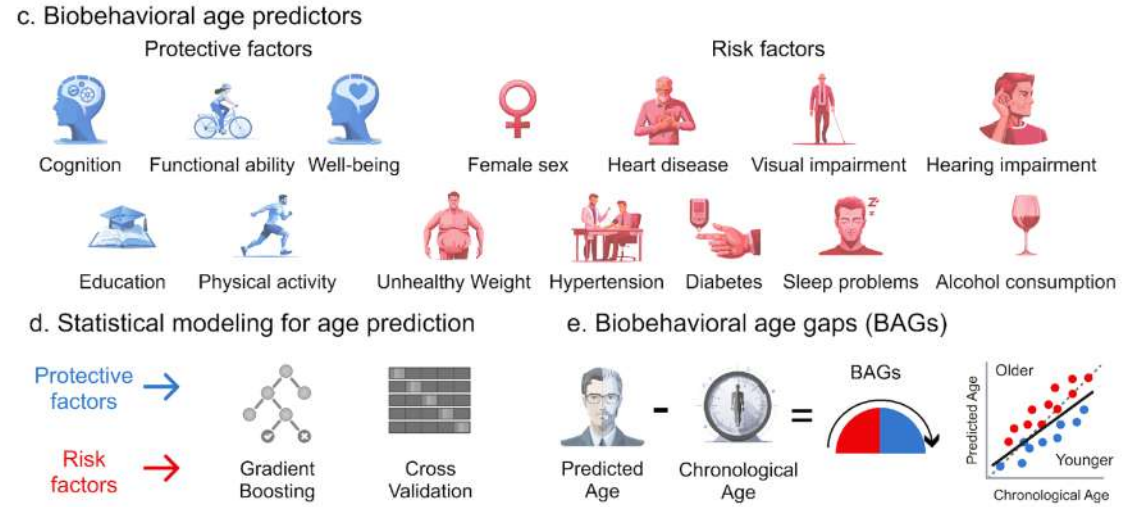
Methods.

- Assessment of national aging survyes of 63.592 adults from Europa and Latin America to predict bio-behavioral aging clocks.

- Assessment of world values survey to predict country-level societal values (40 countries).







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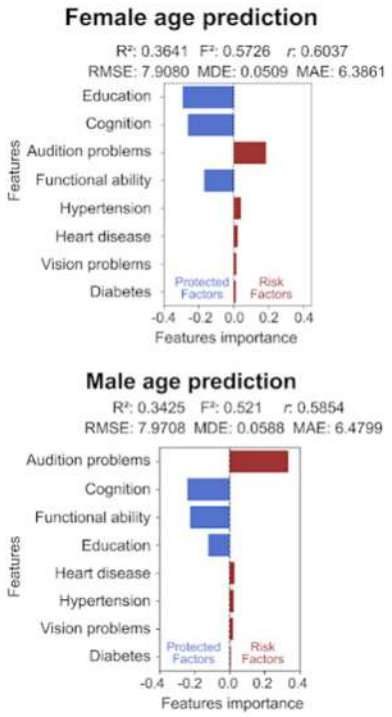
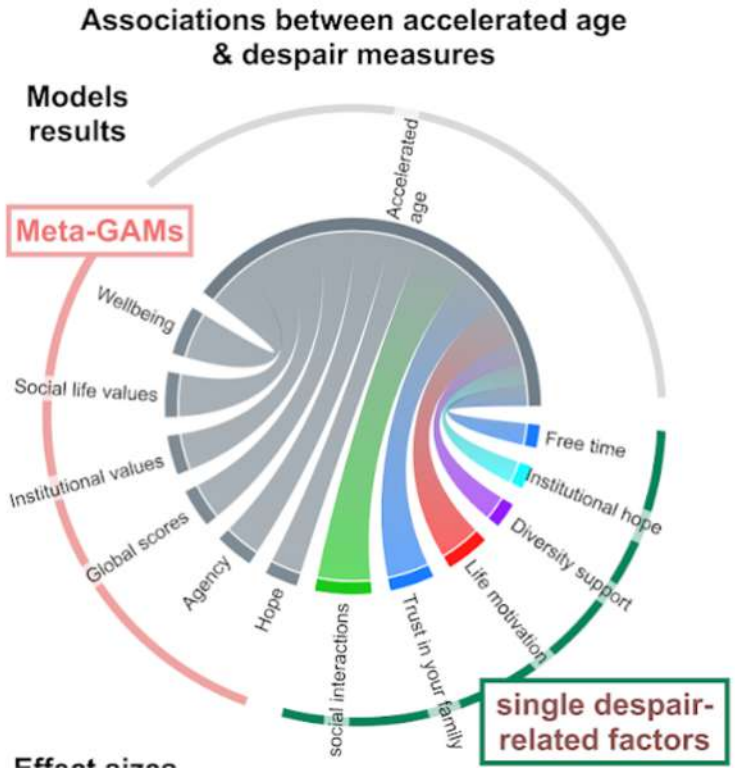
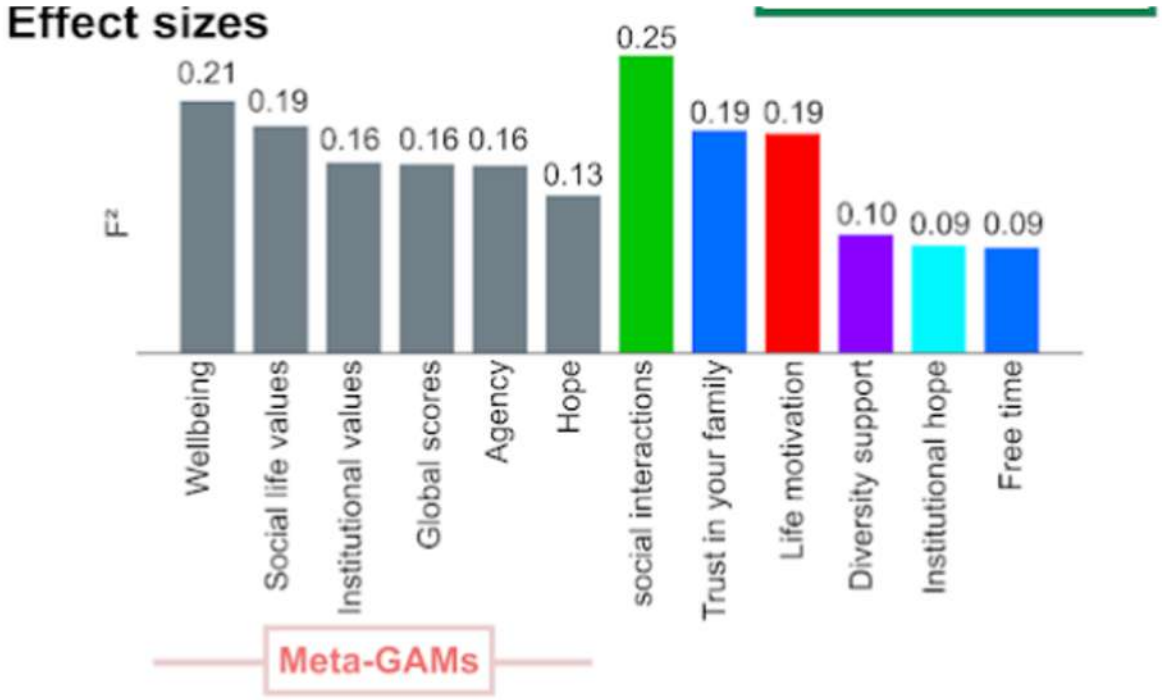
Results

Aging acceleration determined by bio-behavioral clocks was impacted by societal values indexes across 40 countries.







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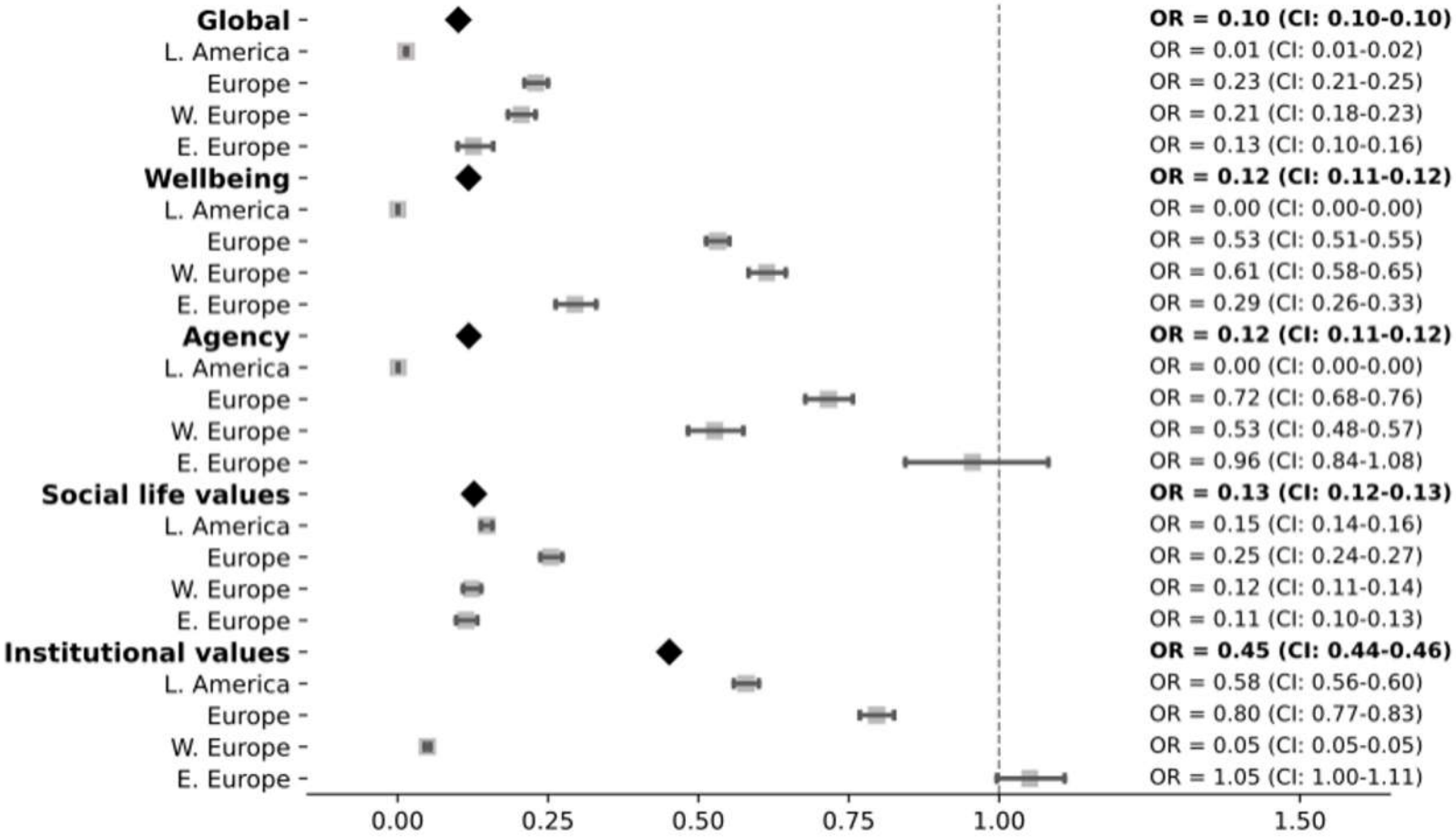
Results

Countries with more possitive societal values exhibited delayed age acceleration with regional differences.

Critically, no association of agency, institutional values and age acceleration in East Europe was detected (possibly due to sociocultural and democratic factors).



Santamaría García et al Social values related inform healthy and accelerated aging. Under preparation. 2025

Social factors at individual and country-level impacts brain acceleration processes.

Brain clocks across different populations affected by diversity and disparities in aging and dementia

nature medicine

Article

https://doi.org/10.1038/s41591-024-03209-x

Brain clocks capture diversity and disparities in aging and dementia across geographically diverse populations

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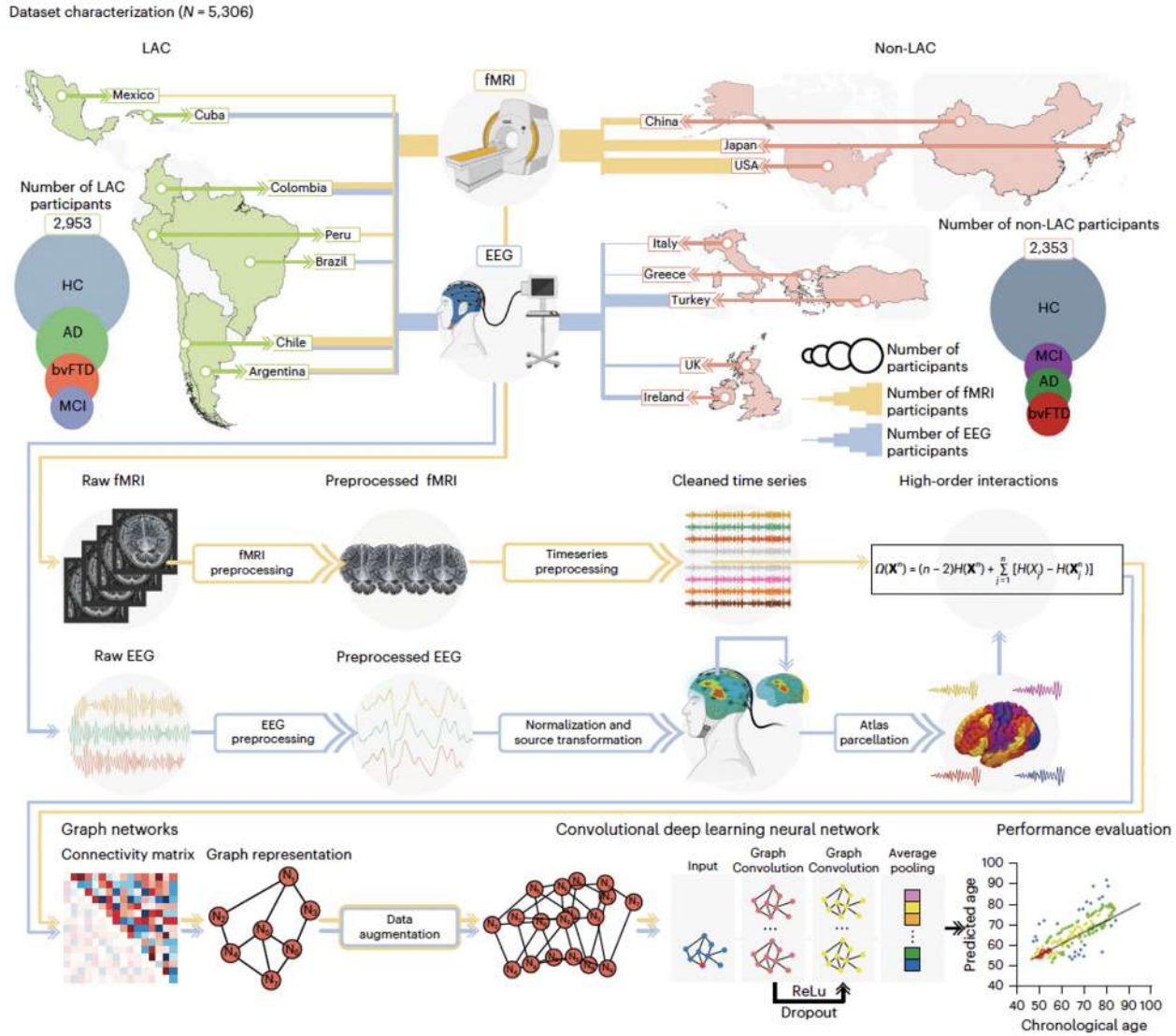
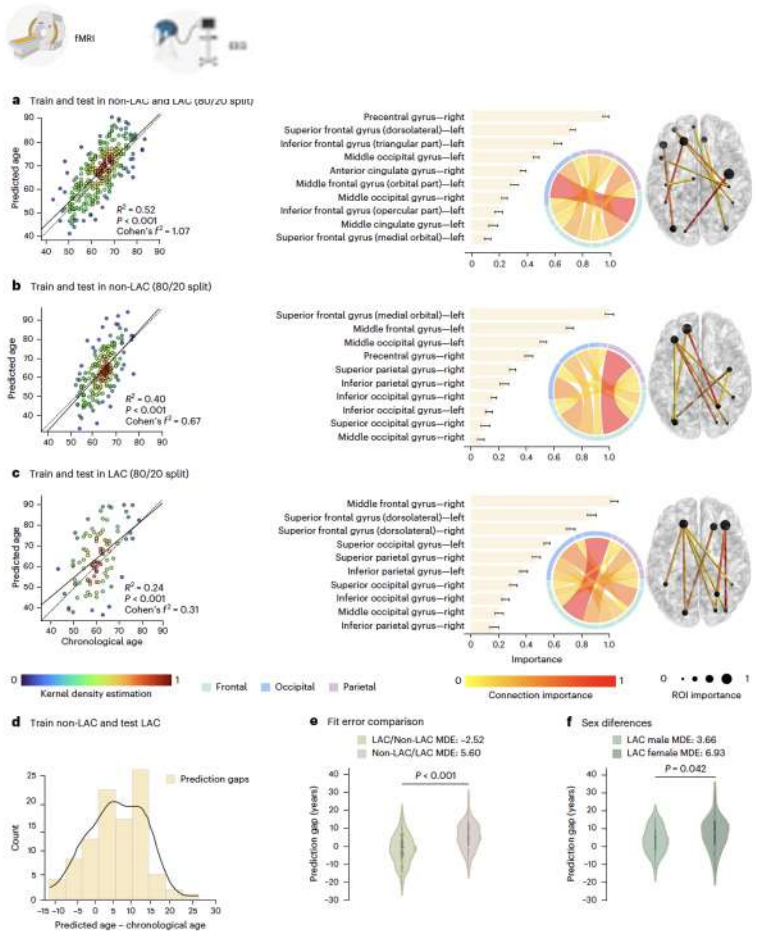
A list of authors and their affiliations appears at the end of the paper

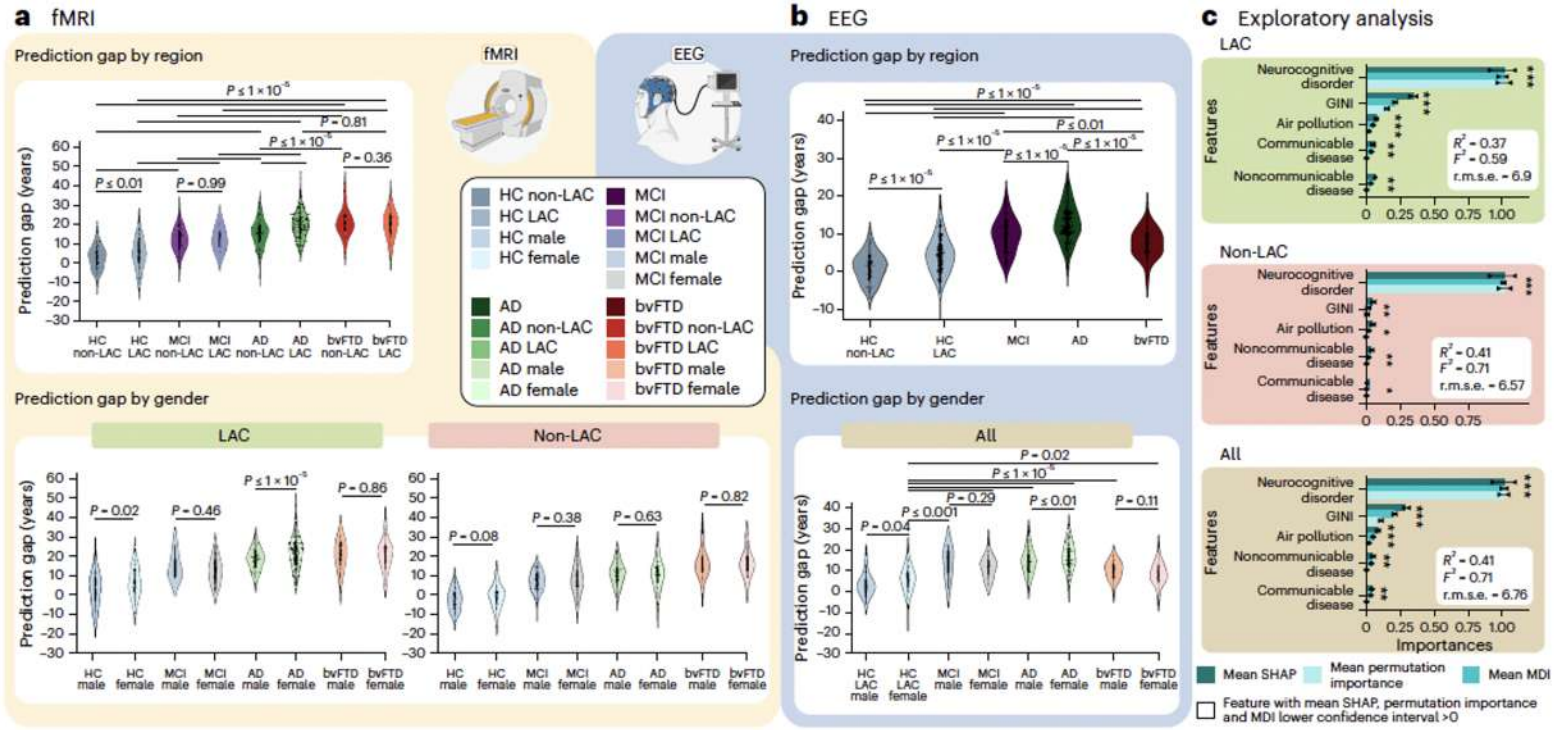


Moguilner et al Nature Medicine 2024

Critical finding: Different exposomes impact accelerated brain age across diverse populations in aging and dementia

Brain clocks across different populations affected by exposomes





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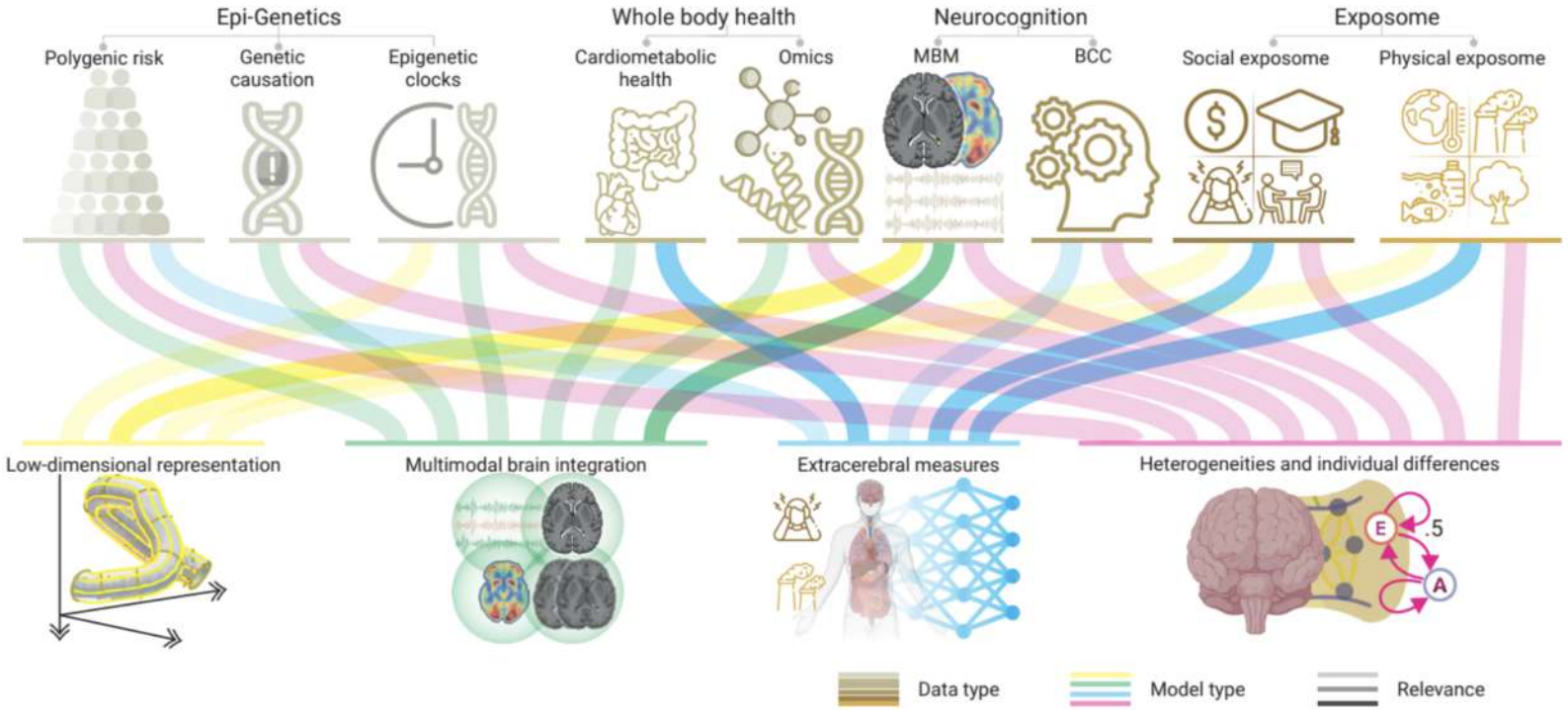
Critical finding: Different exposomes impact accelerated brain age across diverse populations in aging and dementia

The need of synergetic approaches to understand human mind and behaviors

Human mind emerges from brain-body-context-culture complex interactions



Santamaría-García H. Computational whole-body-exposome models for global precision brain health. Nature Com. 2025

Thank you

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