POLITECNICO MILANO 1863

Regular Exercise & Telomere Length

Bioinformatics for Computational Genomics
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Research Question & Objectives

Does physical activity help preserve telomere length — a biomarker of aging — in the adult U.S. population?

- How does exercise affect telomere length variation in aging?
- To what extent do demographic factors have an impact?
- Do different types and intensity of activity affect telomere length?

Dataset: NHANES 2001–2002 (and 1999-2000)

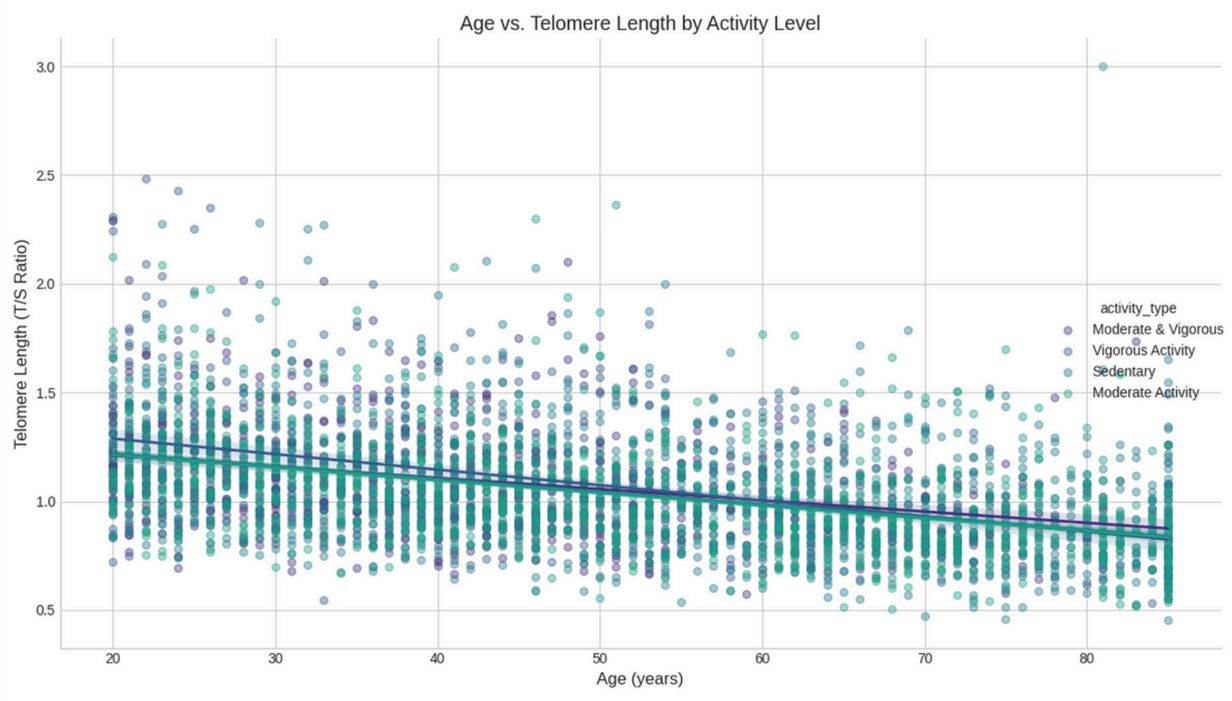
Nationally representative U.S. health survey conducted by the CDC, including extensive demographic, physical activity, and laboratory data on ~10,000 participants.

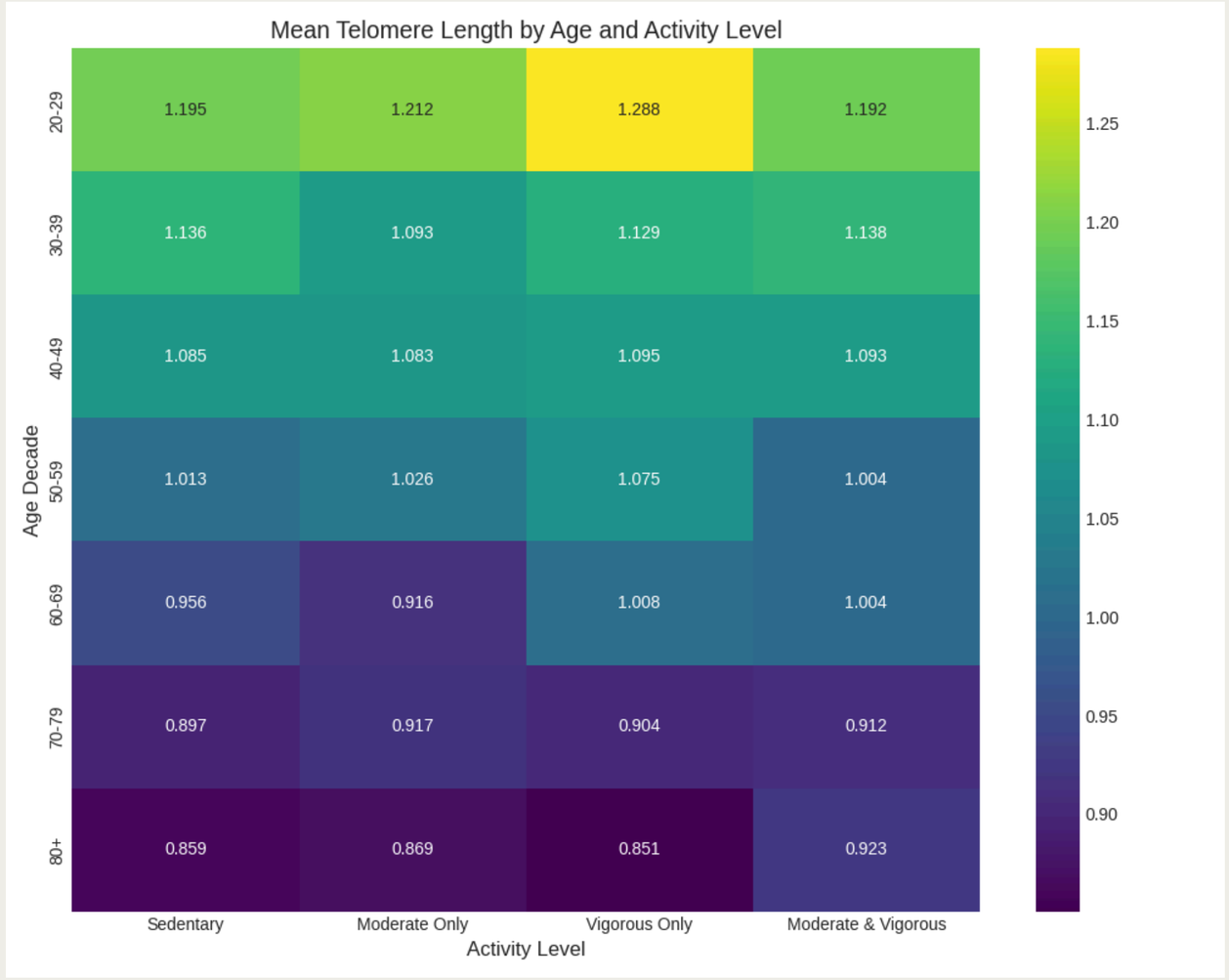
- **Merged 3 files**: demographics, telomere length (TELO_B), physical activity (PAQ_B)
- **Key variables used**:
  - TELOMEAN: average telomere length (qPCR T/S ratio)
  - RIDAGEYR, RIAGENDR, RIDRETH1: age, sex, ethnicity
  - PAD320, PAD440, etc.: physical activity and sedentary behavior indicators

Study sample includes ~4,000 adults aged 20 to 85 with valid measurements of telomere length and physical activity behaviors.

We selected this dataset as it is high-quality, publicly available, and suitable for exploring biological aging in a general population.

Preliminary Figures

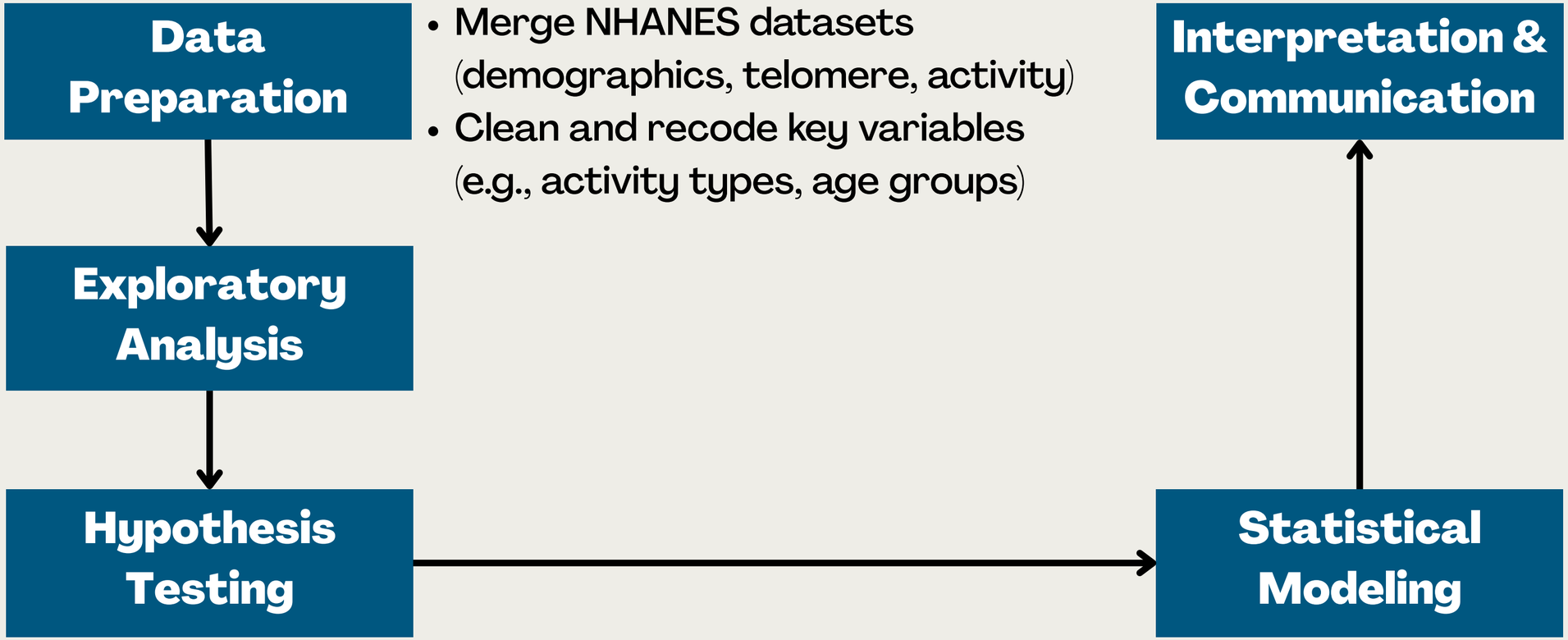




Sedentary, Moderate, Vigorous, Moderate and Vigorous

Goal & Roadmap of the Project

🚀 Investigate whether different types or intensities of physical activity are associated with **telomere length**, a biomarker of cellular aging, in U.S. adults —
and whether this relationship is independent of **chronological age**.



This roadmap may evolve as we continue working on the data, refine our hypotheses, or discover new patterns worth exploring.

Thank you for your attention!

Questions & Next Steps

Sources

Schellnegger, M., Lin, A.C., Hammer, N. et al. Physical Activity on Telomere Length as a Biomarker for Aging: A Systematic Review. Sports Med - Open 8, 111 (2022). https://doi.org/10.1186/s40798-022-00503-1

Arsenis NC, You T, Ogawa EF, Tinsley GM, Zuo L. Physical activity and telomere length: Impact of aging and potential mechanisms of action. Oncotarget. 2017 Jul 4;8(27):45008-45019. doi: 10.18632/oncotarget.16726. PMID: 28410238; PMCID: PMC5546536.

Østhus IB, Sgura A, Berardinelli F, Alsnes IV, Brønstad E, Rehn T, Støbakk PK, Hatle H, Wisløff U, Nauman J. Telomere length and long-term endurance exercise: does exercise training affect biological age? A pilot study. PLoS One. 2012;7(12):e52769. doi: 10.1371/journal.pone.0052769. Epub 2012 Dec 26. PMID: 23300766; PMCID: PMC3530492.

Sellami M, Bragazzi N, Prince MS, Denham J, Elrayess M. Regular, Intense Exercise Training as a Healthy Aging Lifestyle Strategy: Preventing DNA Damage, Telomere Shortening and Adverse DNA Methylation Changes Over a Lifetime. Front Genet. 2021 Aug 6;12:652497. doi: 10.3389/fgene.2021.652497. PMID: 34421981; PMCID: PMC8379006.