

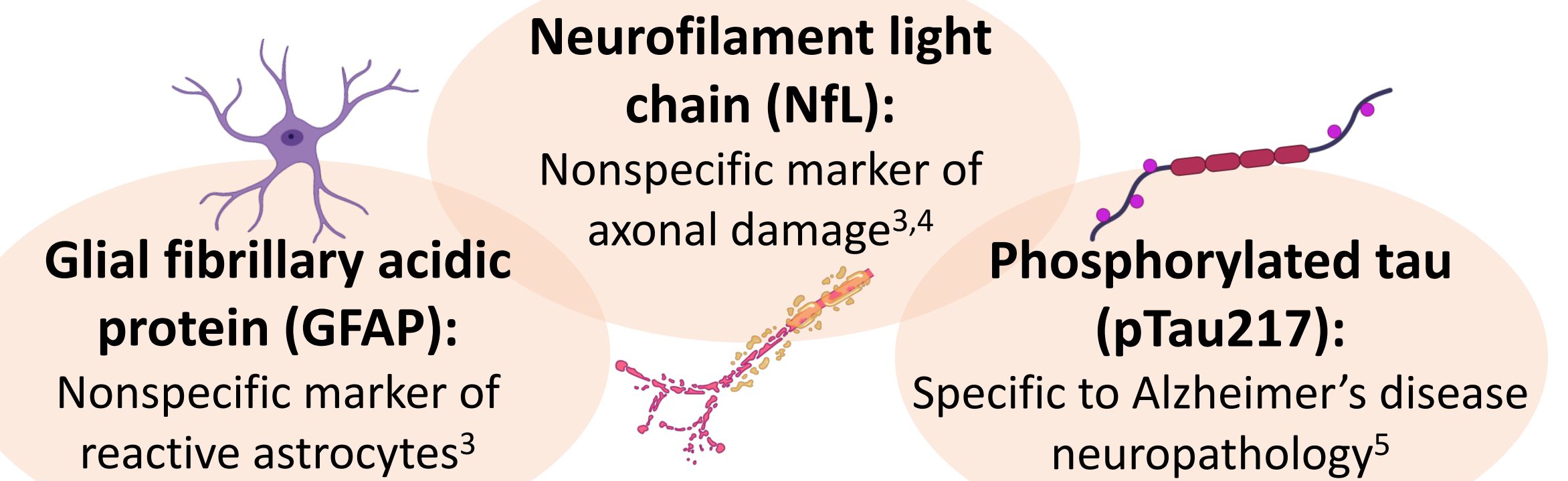
BACKGROUND

- Physical activity (PA) promotes neuronal health and can mitigate the risk for neurodegenerative diseases^{1,2}
- Blood-based biomarkers enable accessible and cost-effective detection of early neurodegeneration (**Figure 1**)

RESEARCH QUESTION

Is physical activity associated with trajectories of blood-based biomarkers?

Figure 1: Blood-based biomarkers of neurodegeneration



METHODS

Subset of the Rhineland Study

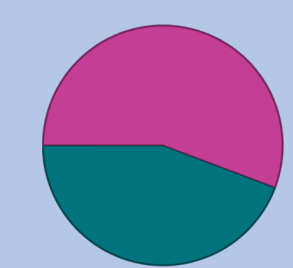
- Ongoing prospective, community-based cohort study in Bonn (Germany)
 - N = 6154 participants at baseline
 - N = 3604 participants re-invited during Covid-19 pandemic
 - N = 2853 participants at follow-up
- Average time between baseline and follow-up: 5.2 years

Age at baseline



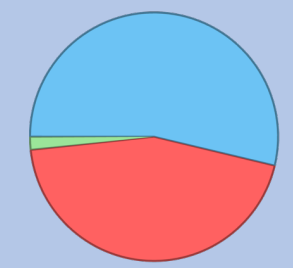
Mean (SD):
56.1 (13.7) years

Biological sex



Female (56%)
Male (44%)

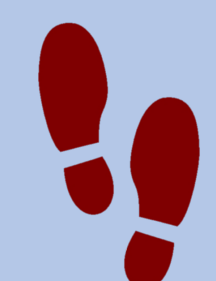
Education



High (54%)
Middle (45%)
Low (2%)

Physical activity at baseline

- 7-day continuous thigh-worn accelerometer recording (activPAL3 micro, 20 Hz)
- Weighted daily averages (mean (SD)):



Step count:
8,740 (3,285)



Energy expenditure in metabolic equivalents (METs):
33.97 (1.38)



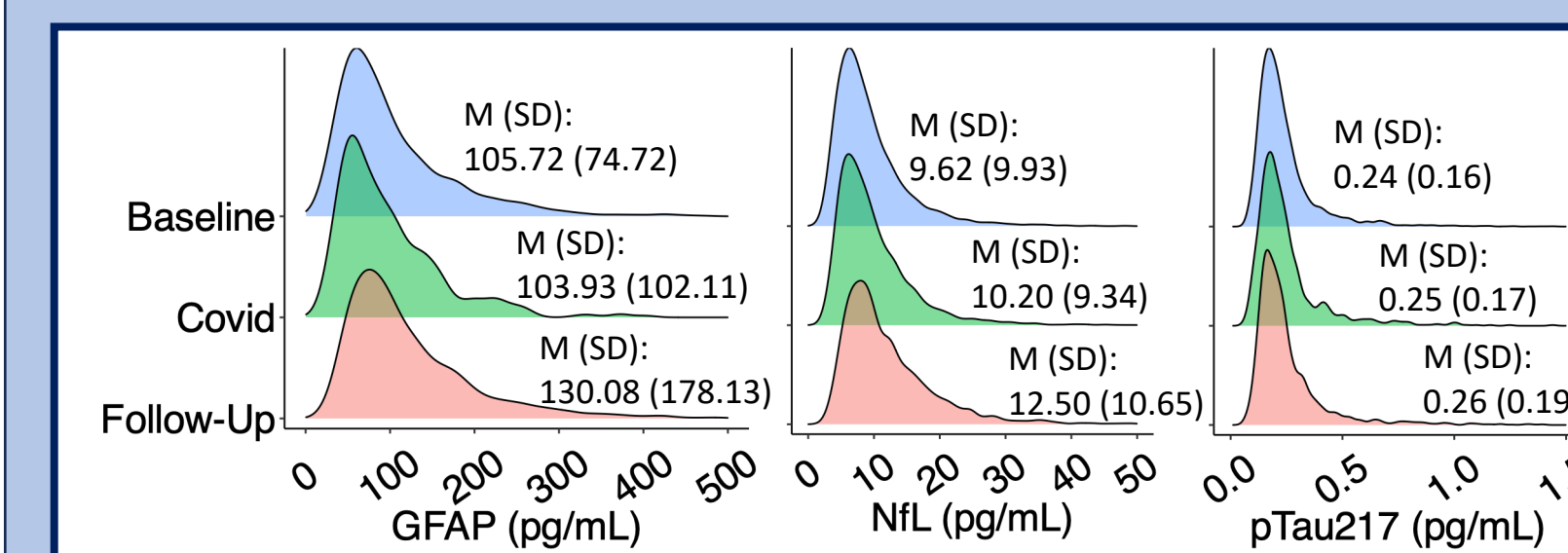
Time spent sedentary in %:
74.4 (6.9)



Time spent in moderate-to-vigorous PA (MVPA) in %:
18.4 (6.3)

Plasma biomarkers of neurodegeneration at three timepoints

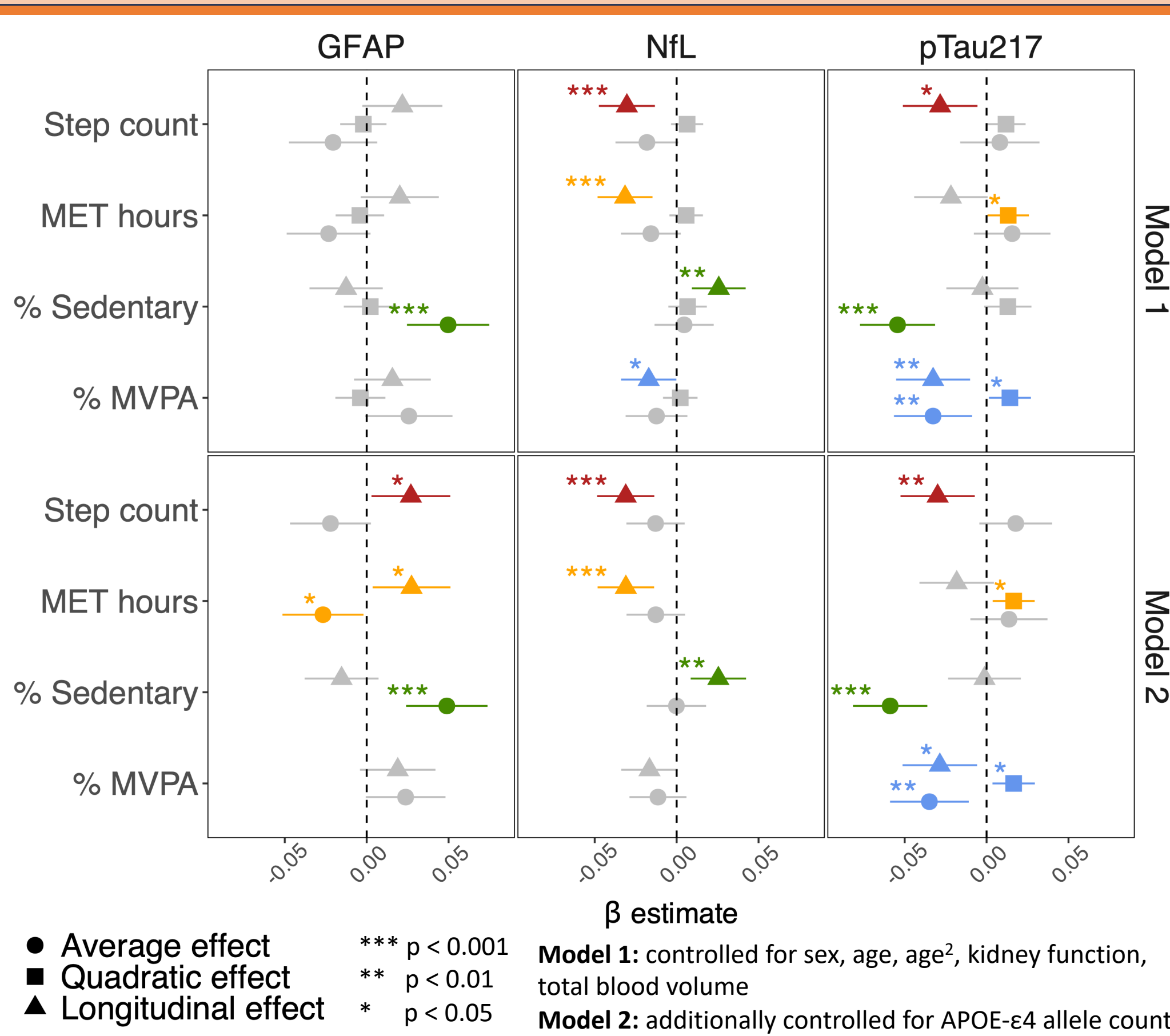
- pTau217:** ALZpath Simoa®
- NfL:** Quanterix Simoa®
- GFAP:** Quanterix Simoa®; OLINK Explore



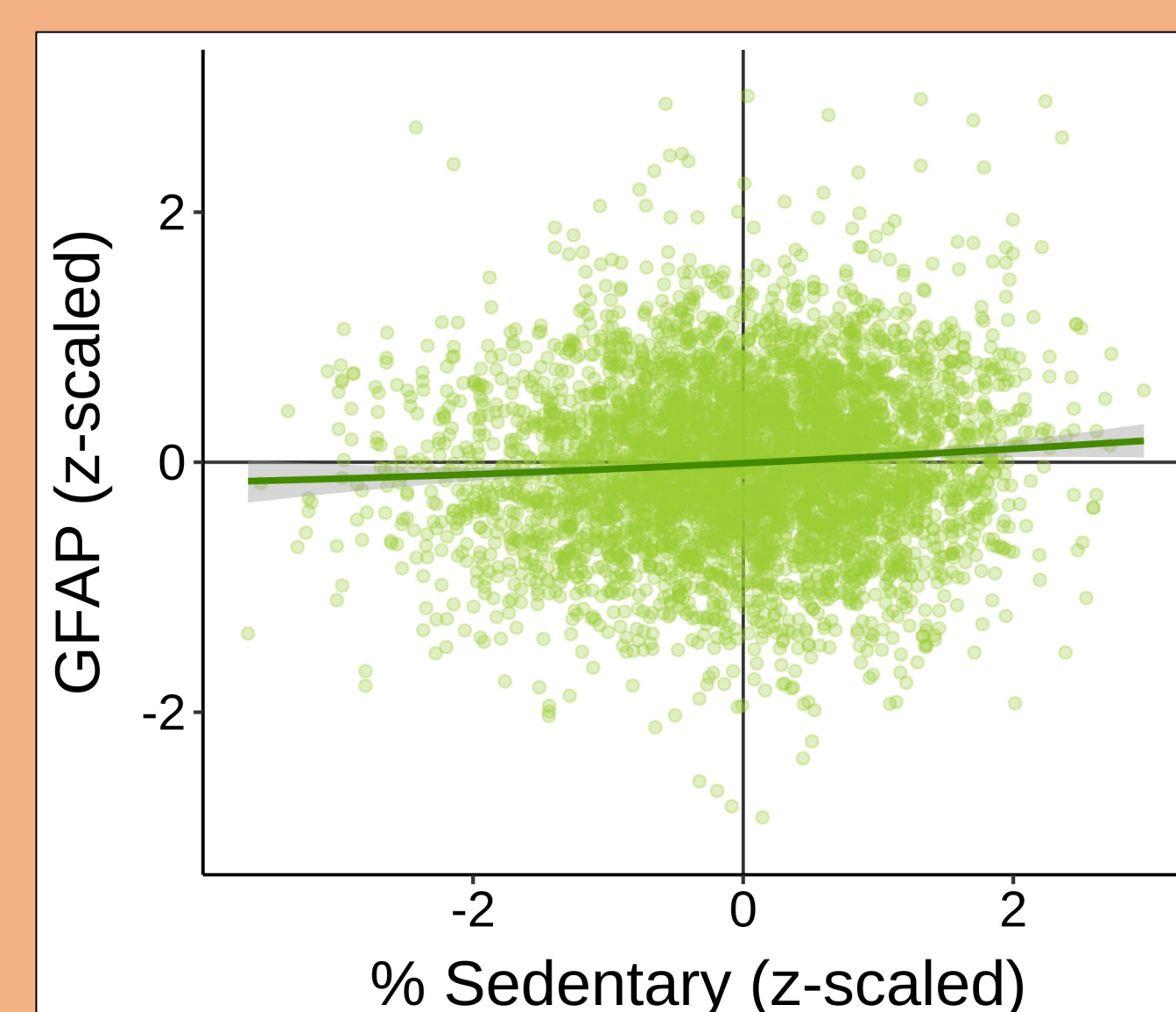
Statistical analyses: Linear mixed models

- Independent variables:**
PA, PA²
- Covariates:**
age, age², sex, APOE-ε4 allele count, kidney function, total blood volume
- Interaction terms:**
PA × age,
PA × sex, PA × APOE,
PA × age × APOE
- Outcomes:**
blood-based biomarkers

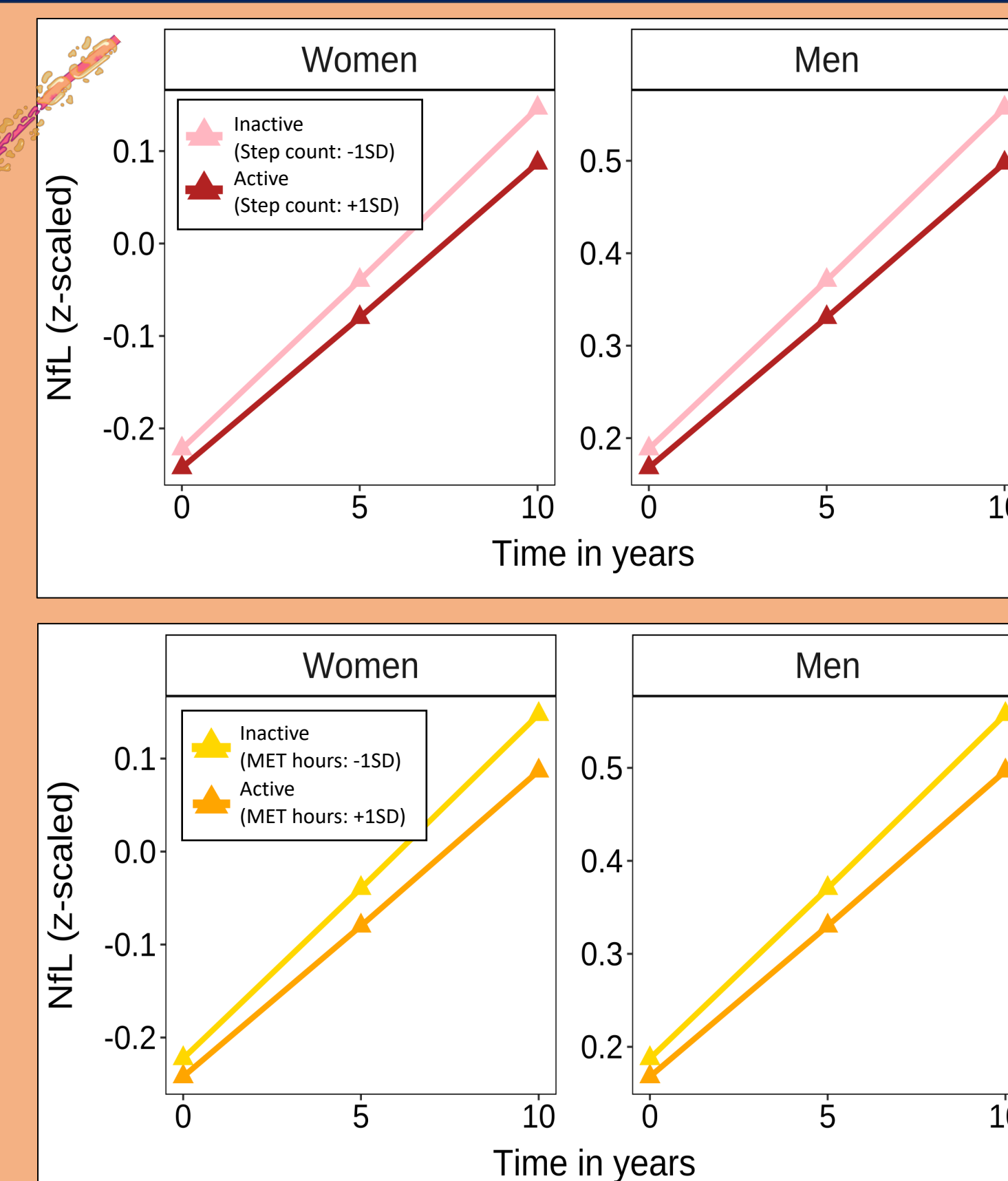
RESULTS



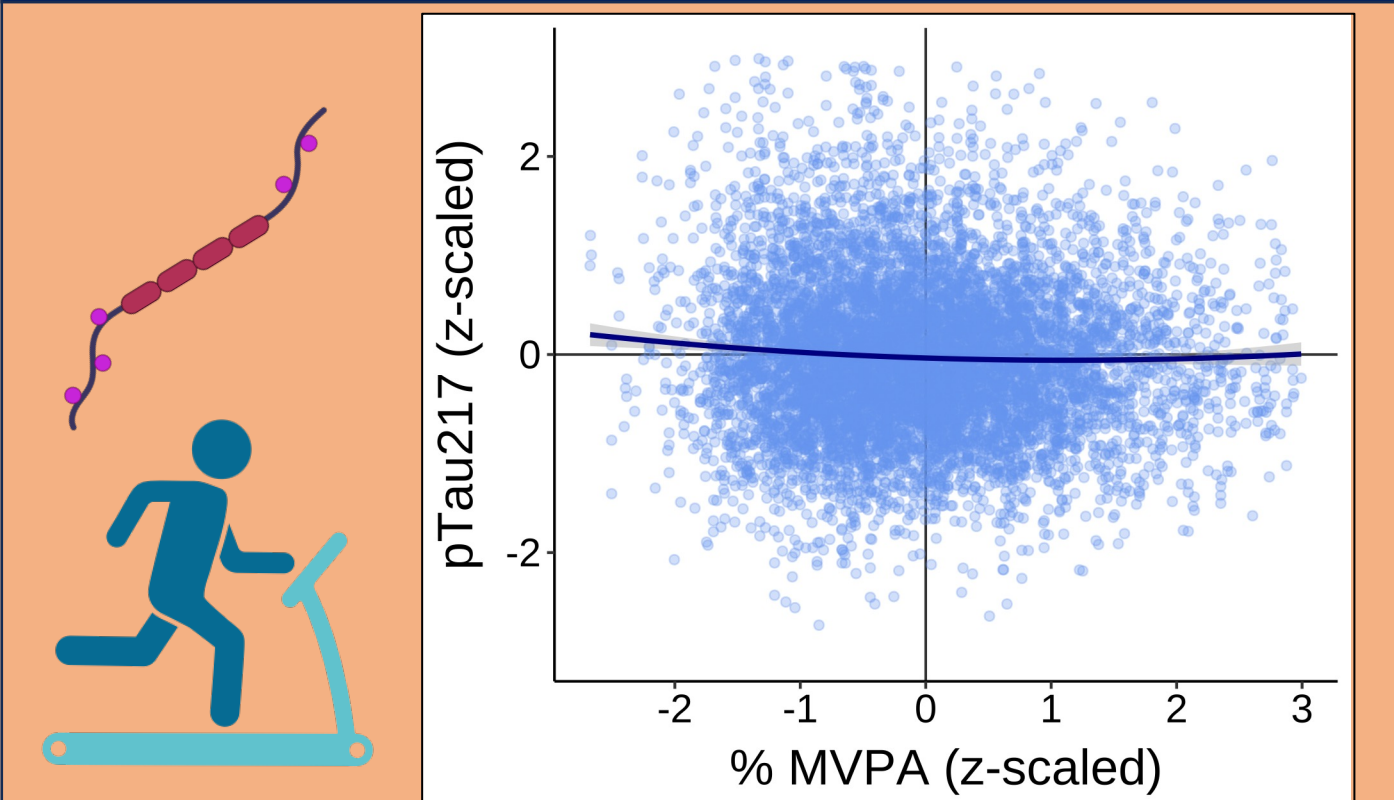
Average effect of sedentary activity on GFAP



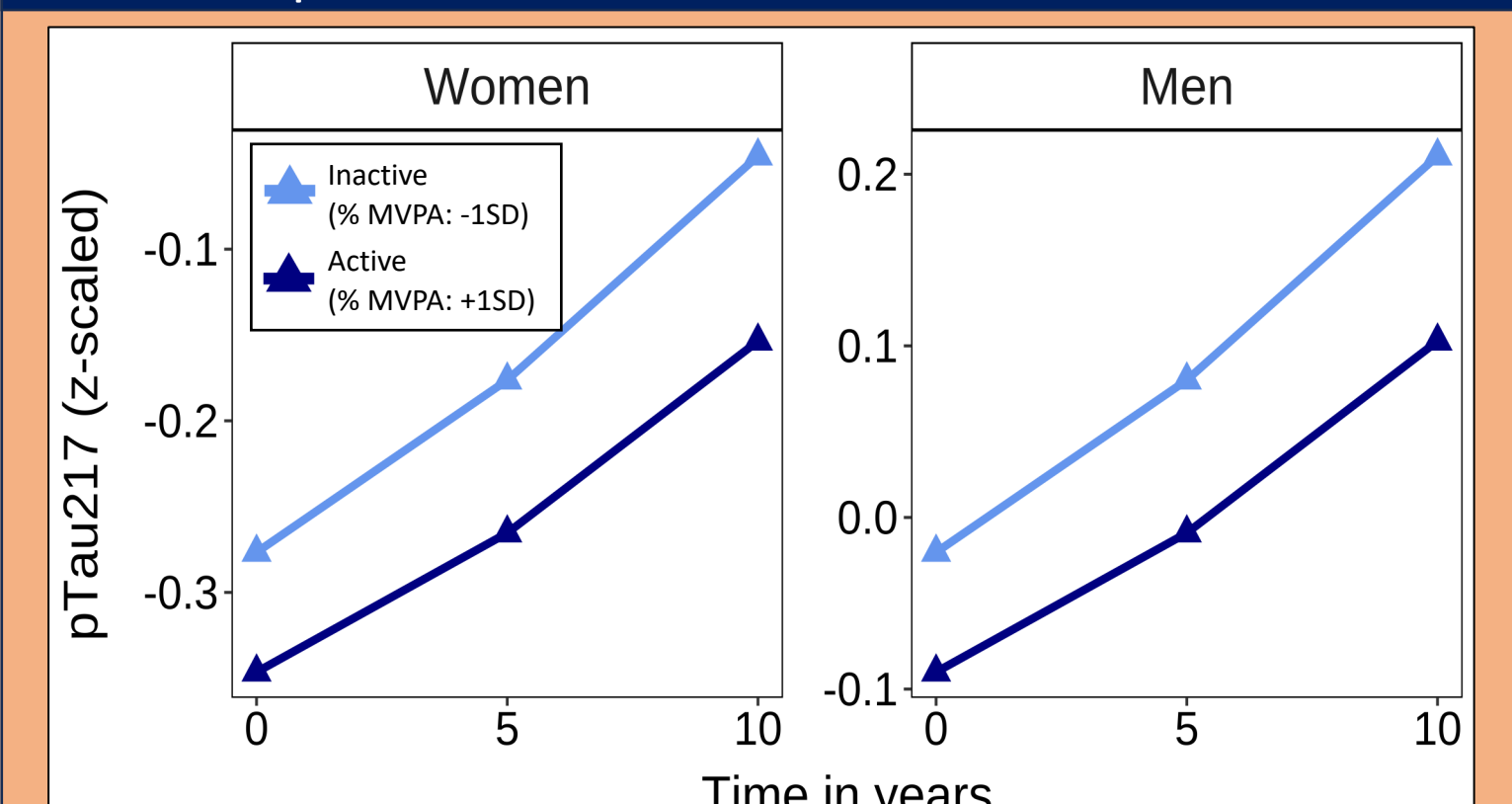
Estimated NfL-levels for inactive vs. active individuals



Average effect of moderate-to-vigorous PA on pTau217

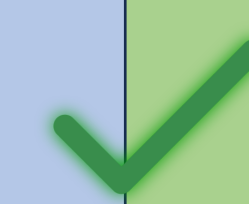


Estimated pTau217-levels for inactive vs. active individuals

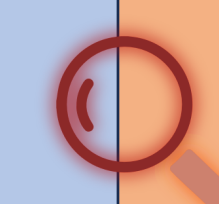


CONCLUSION

- Higher sedentary time is associated with higher average GFAP-levels and a more pronounced increase of NfL
- Higher PA is associated with reduced age-related increases of NfL
- Higher moderate-to-vigorous PA is associated with lower average levels of pTau217 and slower age-related increase of pTau217
- No robust interactions of PA with sex or the APOE genotype were found



- Large cohort study
- Longitudinal data for novel biomarkers
- Objective measure of physical activity



→ Longer follow-up times and intervention studies are needed to gain a deeper understanding of temporal relationships between PA and blood-based biomarkers