

# Benchmarking Thai INDE cohort with the Alzheimer's Disease Neuroimaging Initiative (ADNI)

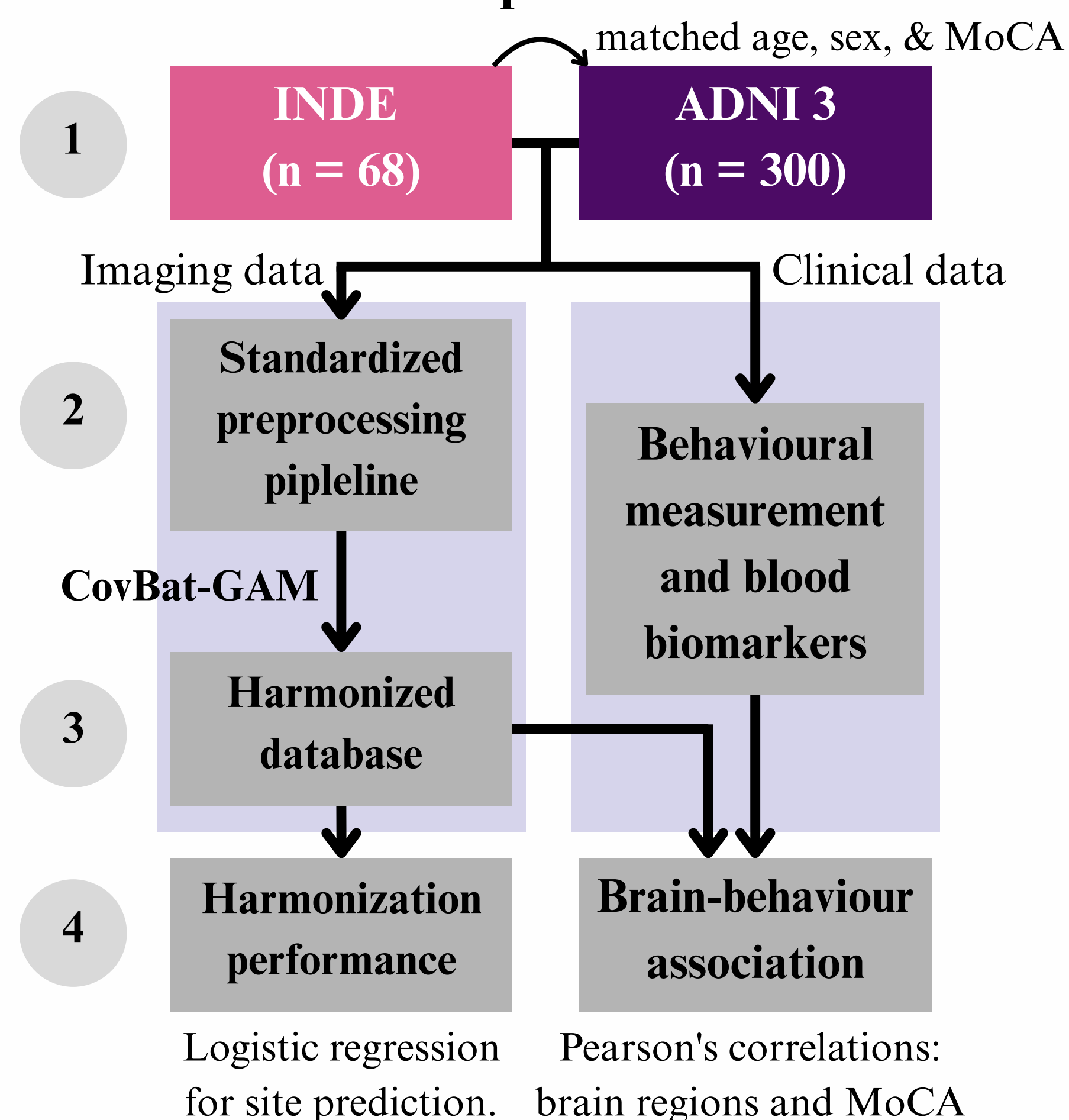
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## Background

- Integrating large-scale datasets is important for generalizable discoveries in Alzheimer's disease research; however, site- and scanner-specific effects limit cross-cohort comparability.
- Thai Investigating Neurocognitive Disorders Epidemiology (INDE) cohort characterizes comprehensive biomarkers in Thai individuals across the dementia spectrum. (NCT06375213)
- This study aims to harmonize imaging-derived phenotypes (IDPs) from the INDE cohort with Alzheimer's Disease Neuroimaging Initiative (ADNI), and evaluate whether harmonization improves cross-cohort comparability.

## Method

- Participants:** INDE and ADNI cohorts (data accessed via the LONI-IDA under an approval)
- Data acquisition**
  - Clinical data and blood biomarkers
  - Imaging modalities: T1-weighted MRI, amyloid SUVR from FBB and FBP PET, and tau SUVR from AV-1451 PET scans
- Harmonization:** CovBat-GAM (adjusting for mean and covariance site effects).
- Examine harmonization performance**



## Results

- Clinical and blood biomarker data were comparable between cohorts. (Figure 1).xs
- CovBat-GAM reduced site-related differences across modalities, with site detection accuracy decreasing to chance level ( $p < 0.001$ ) (Figure 2).
- Brain-behavior associations for structural MRI and tau-PET were reproducible in INDE compared to ADNI (Figure 3).

Table 1. Baseline demographics

| Variable             | INDE (n=68) | ADNI (n=300) | p-value |
|----------------------|-------------|--------------|---------|
| <b>Demographics</b>  |             |              |         |
| Age, years           | 69.7 ± 8.5  | 71.0 ± 7.1   | 0.351   |
| Female, n (%)        | 51 (75.0%)  | 159 (53.0%)  | 0.002   |
| APOE4 carrier, n (%) | 27 (47.4%)  | 141 (47.6%)  | 1       |
| <b>Diagnosis</b>     |             |              |         |
| CN, n (%)            | 11 (16.2%)  | 48 (16.0%)   | 0.981   |
| MCI, n (%)           | 40 (58.8%)  | 180 (60.0%)  |         |
| Dementia, n (%)      | 17 (25.0%)  | 72 (24.0%)   |         |

Figure 1. Demographic data, neuropsychological test, and plasma biomarkers results compared between INDE and ADNI cohorts.

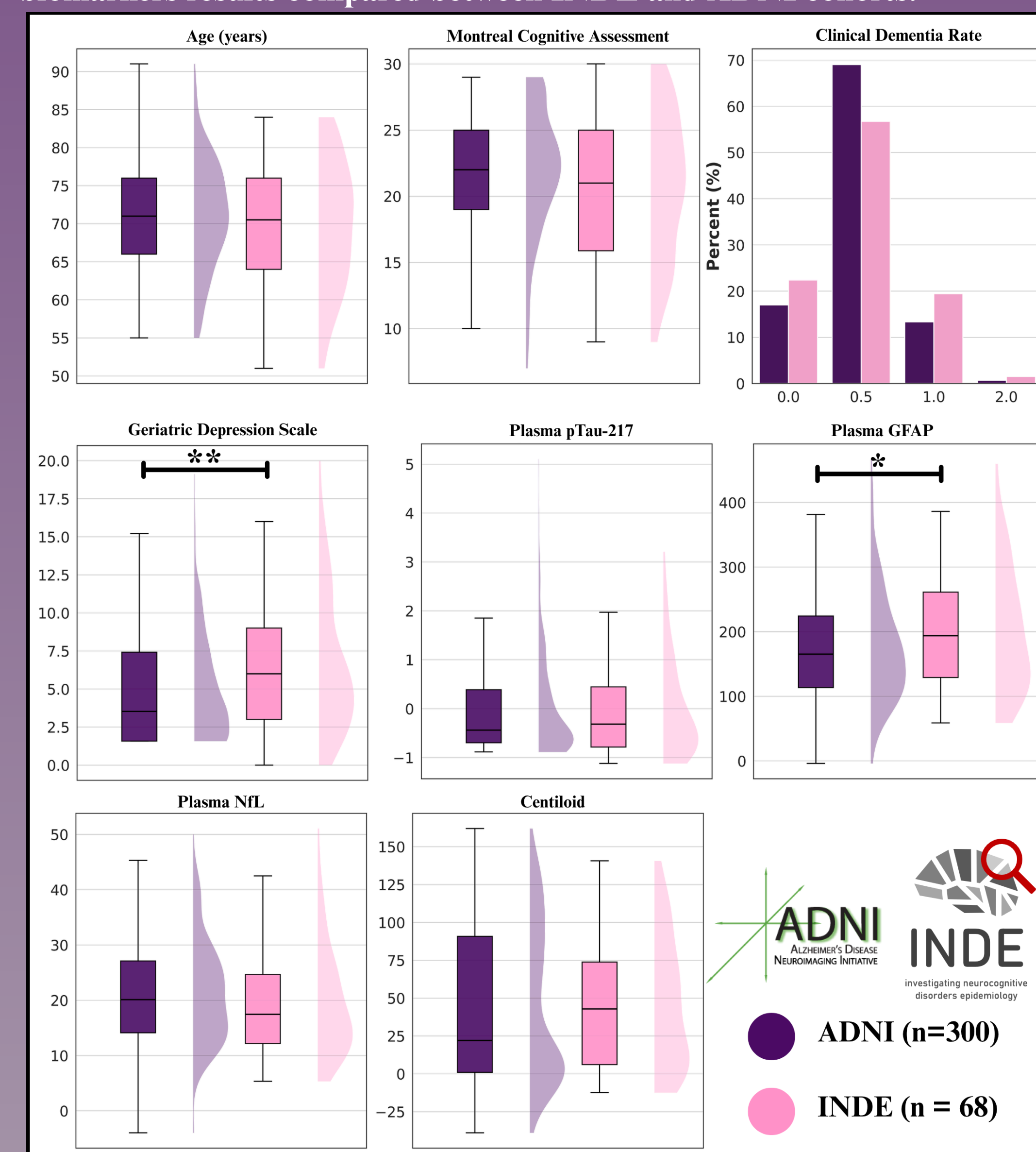


Figure 2. Efficacy of harmonization: Age and IDP relationships (Linear regression) and site prediction accuracy (Logistic regression) compared between pre- and post-harmonization.

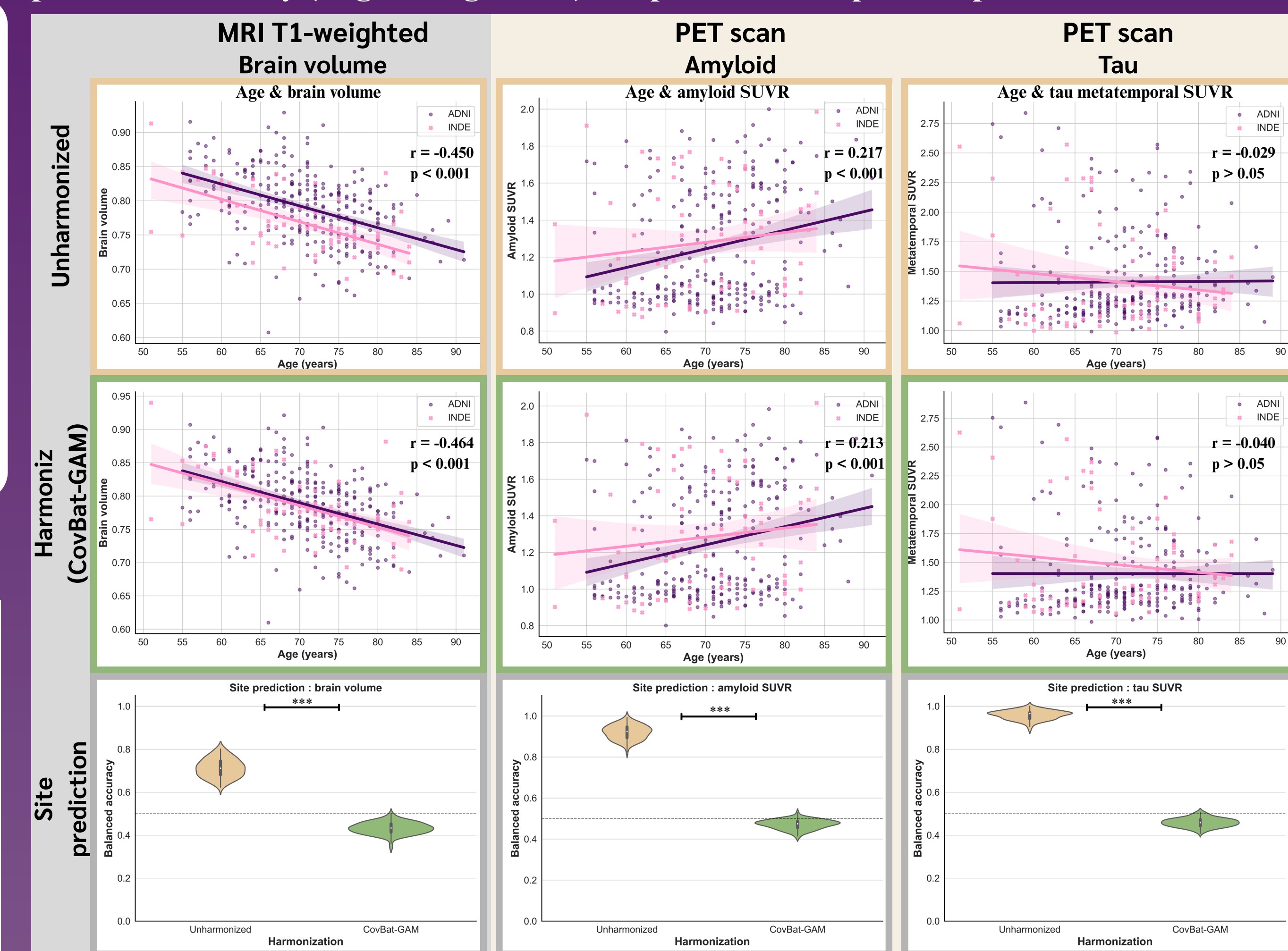
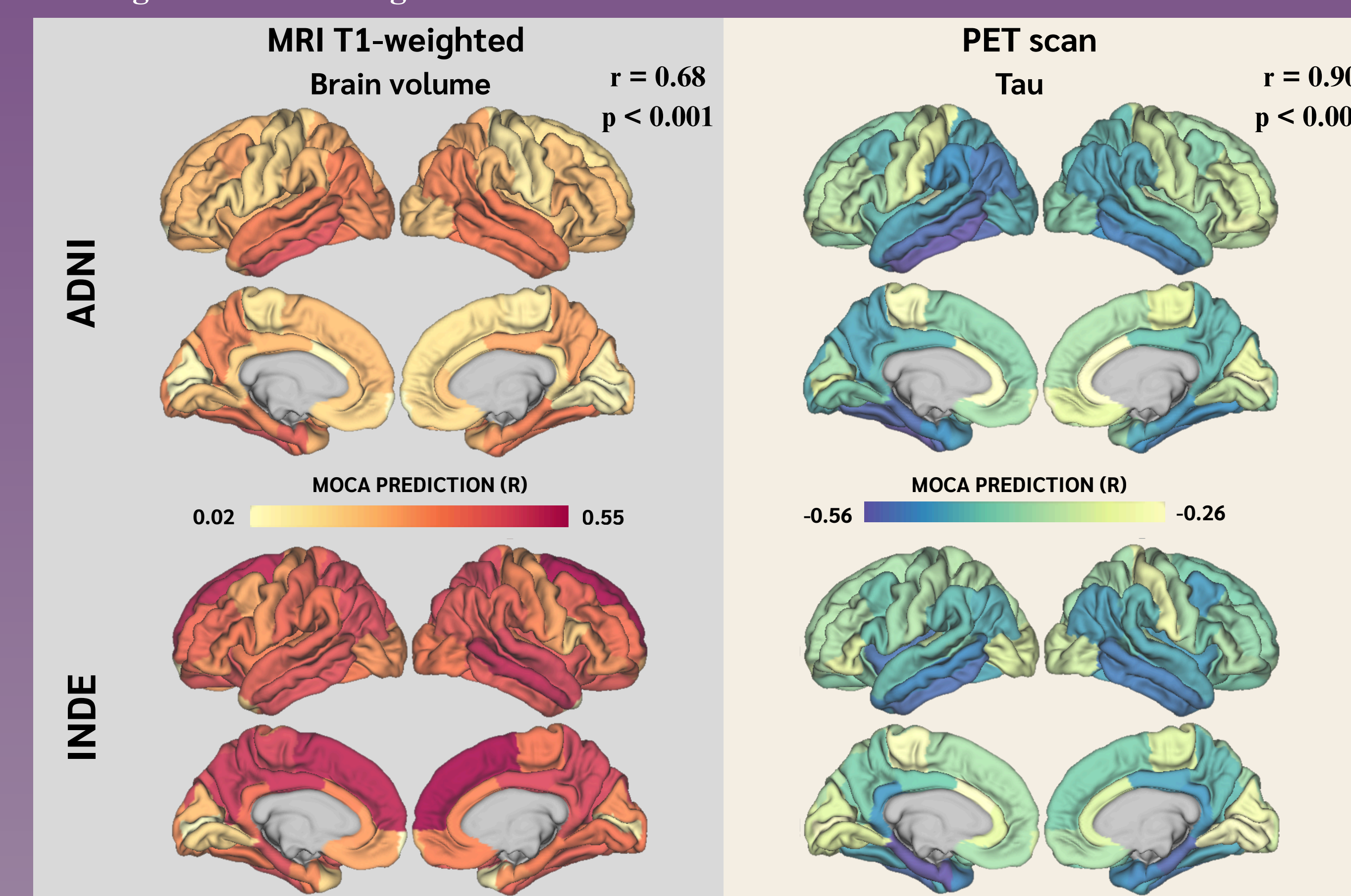


Figure 3. MoCA score prediction in ADNI and INDE cohorts using brain volume from T1-weighted MRI and regional SUVR from tau PET.



## Conclusion

- CovBat-GAM effectively reduced site-effects across neuroimaging modalities while preserving biological associations.
- Further investigation on cross-cohort predictability is warranted, particularly leveraging large-scale datasets to build models that generalize to smaller local cohorts.