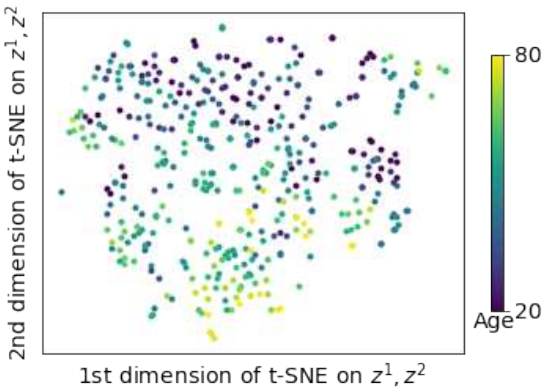

Figure S1: Experiments on healthy aging: Latent space of fine-tuned model on age prediction with pre-trained model by the proposed LNE projected into 2D t-SNE space of z. Samples are color-coded by the age of z.

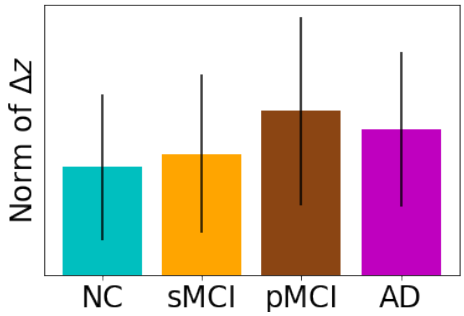

Figure S2: Plotting the norm of speed of aging (i.e., Δz) for the four cohorts as encoded by LNE. The aging progression of AD (pink) and pMCI (brown) were significantly ($p < 0.01$, two-sided t-test) faster than NC (cyan) and sMCI (orange).

Supplement

We visualized the latent space of the fine-tuned encoder for chronological age prediction in Figure S1. We color-coded the samples by their chronological age. The proposed method yielded a manifold stratified by age.

As we reported in Section 5.2, vectors Δz of AD and pMCI were significantly ($p < 0.01$, two-sided t-test) longer (i.e., progressed faster) than NC and sMCI. It is further visually shown by the boxplot in Figure S2.

We further visualized the fine-tuned latent space of NC vs. AD classification in Figure S3. We color-coded the samples by Mini Mental State Exam (MMSE),

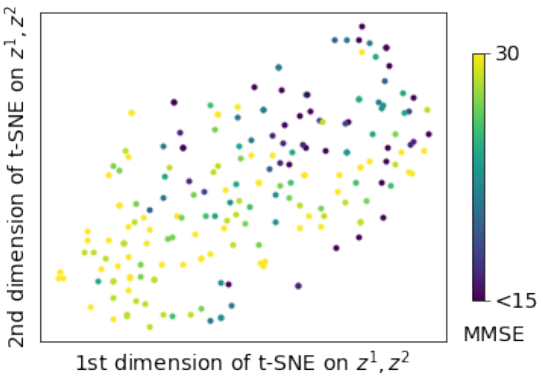

Figure S3: Experiments on ADNI: Latent space of fine-tuned model on NC vs AD classification with pre-trained model by the proposed LNE projected into 2D t-SNE space of z. Samples are color-coded by MMSE score.

a score between 0-30 with lower scores suggesting greater cognitive dysfunction (Balsis et al., 2015). NC has a mean MMSE of 29.2, while AD has a mean MMSE of 22.4. The proposed method yielded a manifold stratified by MMSE, which suggests that the pre-trained model by LNE enabled more informative representations for downstream classification compared to other self-supervised methods.