Tracking Divergence of Well-Being across Time: A Unified Approach to Modeling Multi-Dimensional Change

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Background

Objectives:
Both aging and well-being are multi-faceted. This poster forwards a combination of **person** and **variable-oriented methods** to model multi-dimensional change over time. While many previous studies focused on univariate changes, our analysis of **Berlin Aging Studies (BASE)** uses multiple markers of well-being to examine **age** and **history**-graded differences in **multi-dimensional well-being space**.

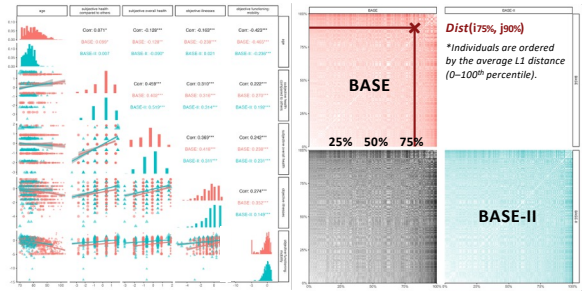
Keywords:
Aging; Physical Health; Subjective Well-Being; Longitudinal; Trajectory Analysis

Data / Methods

- **Data:** Age and cohort-related changes across four dimensions of well-being (objective illnesses/functioning, subjective overall/comparative health) were examined using data from the BASE (1990–1993; *n*=516, aged 70-103) and the BASE-II (2018–2019; *n*=625, aged 70-94).
- **Methods:** Divergence among dimensions was examined using a combination of variable- and person-oriented methods: Structural Equation Modeling (SEM) and Permutational multivariate ANOVA (PERMANOVA).

Fig 1. *Multivariate Statistics*

(a) *Variable-oriented SEM* **(b)** *Person-oriented PERMANOVA*

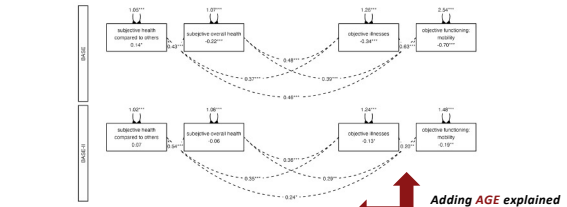


Results

The person-oriented PERMANOVA revealed that divergence across well-being markers increased with age ($F_{1,1063}$ = 36.78, p < .001), but did not evidence any cohort differences ($F_{1,1063}$ = 2.39, p = .387). Complementary variable-oriented results from nested SEMs confirmed that the 4-dimensional covariance structure did not differ across cohorts (χ^2_6=–11.64, p = .070), and that the age pattern was consistent across cohorts.

Fig 2. *Variable-oriented SEM: Path Diagrams*

(a) *Multi-Group SEM*



(b) *Group-Invariant Path Model*

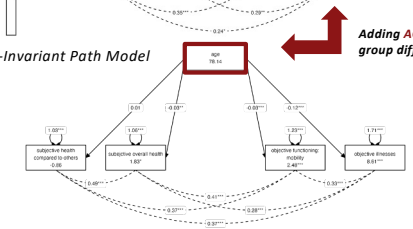
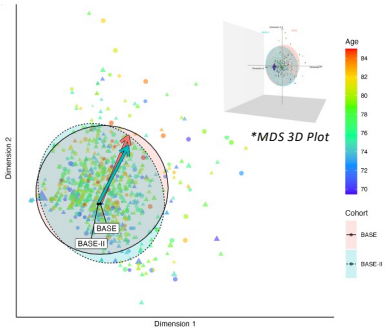


Fig 3. *Person-oriented PERMANOVA: MDS 2-Dimensional Plot**

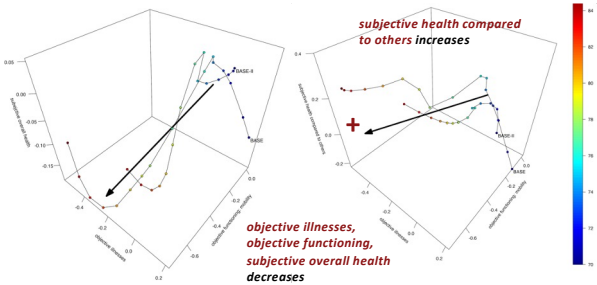


**Classical multi-dimensional scaling. The size of a point (circle [BASE] / triangle [BASE-II] denotes its sampling weight.*

Discussion / Conclusion

Discussion:
Results suggest that evaluative indicators and biomarkers of well-being are increasingly discrepant after age 70, but that the divergences are no larger today than in the past.
Altogether, the findings illustrate the potential for using new combinations of multivariate models to examine multi-dimensional psychological constructs and multi-directional processes in a flexible and accurately quantifiable way.

Fig 4. *Variable-oriented SEM: Predicted Trajectories*



Conclusion:
[1] Both approaches brought the **same** results,
"There only exist age differences; no cohort effects."

Person-Oriented (PERMANOVA)	Variable-Oriented (SEM)
Single test w/higher statistical power	Real-valued prediction
Data-driven approach: Identify important profiles	Theory-driven approach: Flexible latent structures/paths

[2] Multidimensionality, Multiple Time-Scales, & Survey Weights
- Expanding the methods to examine how complexity of multi-dimensional human experience changes over time while accommodating population sampling.

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