CHANGING EDUCATIONAL ATTAINMENT AS A DRIVER OF COHORT CHANGES IN HEALTHY LONGEVITY

A decomposition analysis of US birth cohorts

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BACKGROUND

Change in Life Expectancy (LE)

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Change in Life Expectancy (LE)	Decomposition of change in LE by subpopulation (education)

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Change in Healthy LE	

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Change in Healthy LE	?

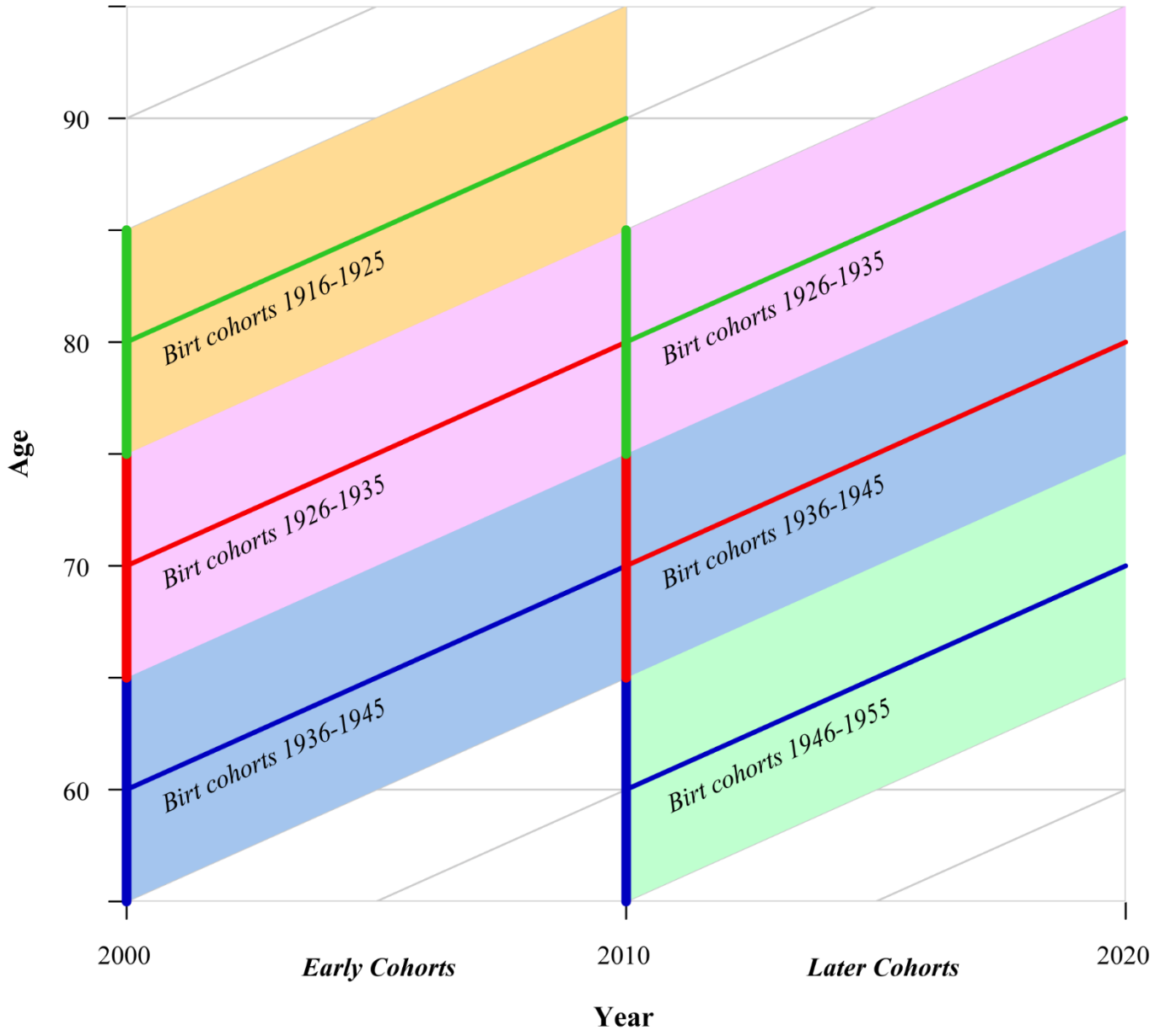
AIMS

How have changes in educational composition and changes in health status within different educational groups led to **cohort patterns in healthy longevity (ADL disability) in the US?**

DATA

- US Health and Retirement Survey (HRS), 2000-2020
- Compare same age group between two cohorts

- ADL Disability
- Four Educational groups: 1. below High School, 2. High School graduate, 3. some college and 4. bachelor and above



METHOD

- Discrete-time multistate model with microsimulation to estimate the 10-year partial cohort healthy life expectancy
  - 3 life expectancies: Disability-free life expectancy (DFLE), Disabled life expectancy (DLE) and Total life expectancy (TLE)
- Derivative based method to decompose the change in these 3 life expectancies

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- Derivative based decomposition method

$$ {}_{\beta-\alpha}\dot{\mathbf{e}}_{\alpha} = \sum_{k} \dot{c}_{\alpha}^{k}\, {}_{\beta-\alpha}\mathbf{e}_{\alpha}^{k} + c_{\alpha}^{k}\dot{\mathbf{i}}_{\alpha}^{k}\, {}_{\beta-\alpha}\mathbb{e}_{\alpha}^{k} + c_{\alpha}^{k}\sum_{x=\alpha}^{\beta-1} \mathbf{l}_{x}^{k}\dot{\mathbf{P}}_{x}^{k} \cdot \left(\frac{\mathbb{I}}{2} + {}_{\beta-x-1}\mathbb{e}_{x+1}^{k}\right) $$

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Change in DFLE and DLE

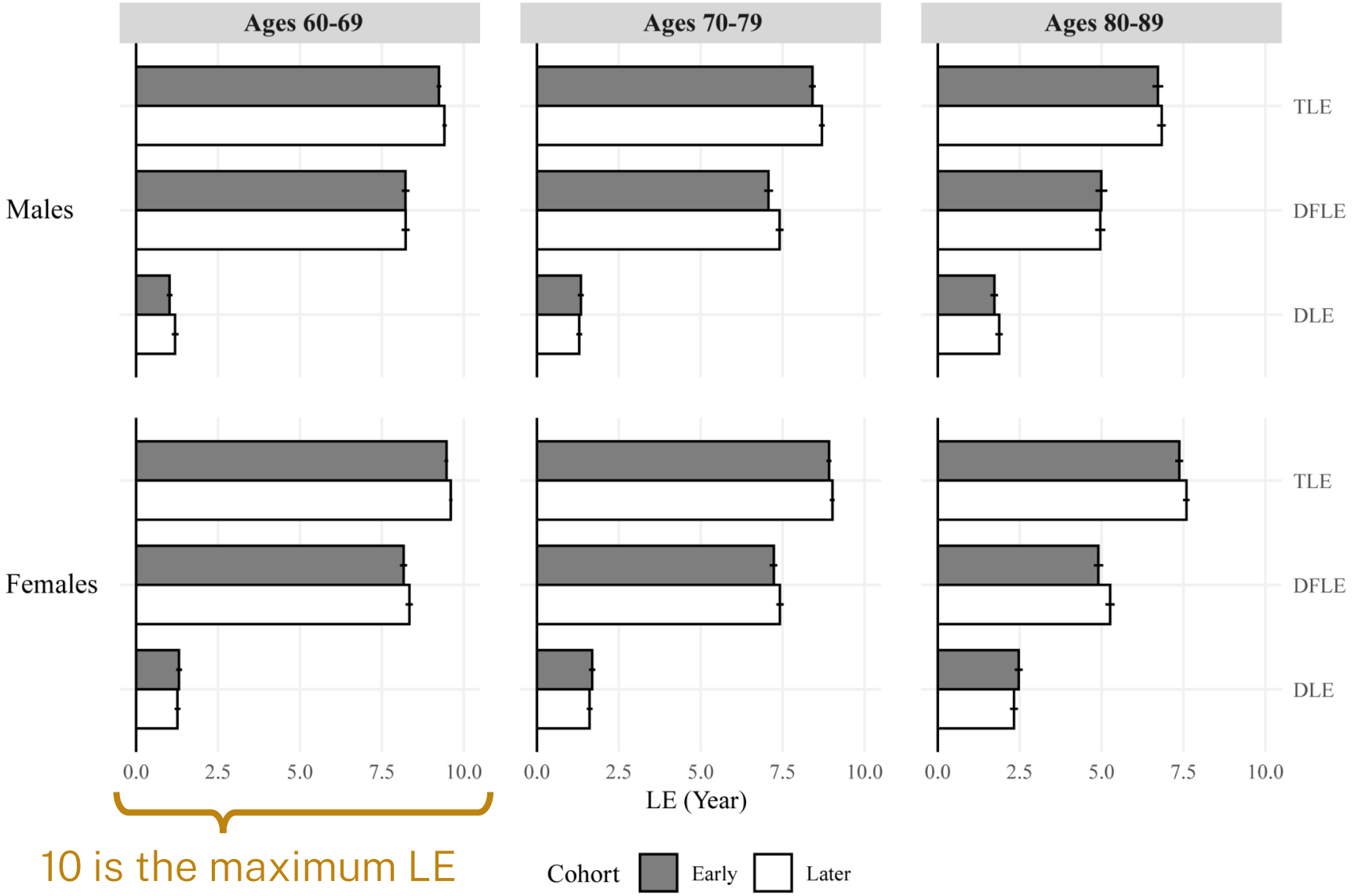
2) Effect from the change in cumulative health at younger ages

$$\overbrace{{}_{\beta-\alpha}\dot{\mathbf{e}}_{\alpha}} = \sum_{k} \underbrace{\dot{c}_{\alpha}^{k}\,{}_{\beta-\alpha}\mathbf{e}_{\alpha}^{k}} + \overbrace{c_{\alpha}^{k}\dot{\mathbf{i}}_{\alpha}^{k}\,{}_{\beta-\alpha}\mathbb{e}_{\alpha}^{k}} + \underbrace{c_{\alpha}^{k}\sum_{x=\alpha}^{\beta-1}\mathbf{l}_{x}^{k}\dot{\mathbf{P}}_{x}^{k}\cdot\left(\frac{\mathbb{I}}{2}+{}_{\beta-x-1}\mathbb{e}_{x+1}^{k}\right)}$$

1) Effect from change in the proportion of the educational group to total population

3) Effect from the change in the health transition at older ages

RESULTS (TLE, DFLE, DLE)

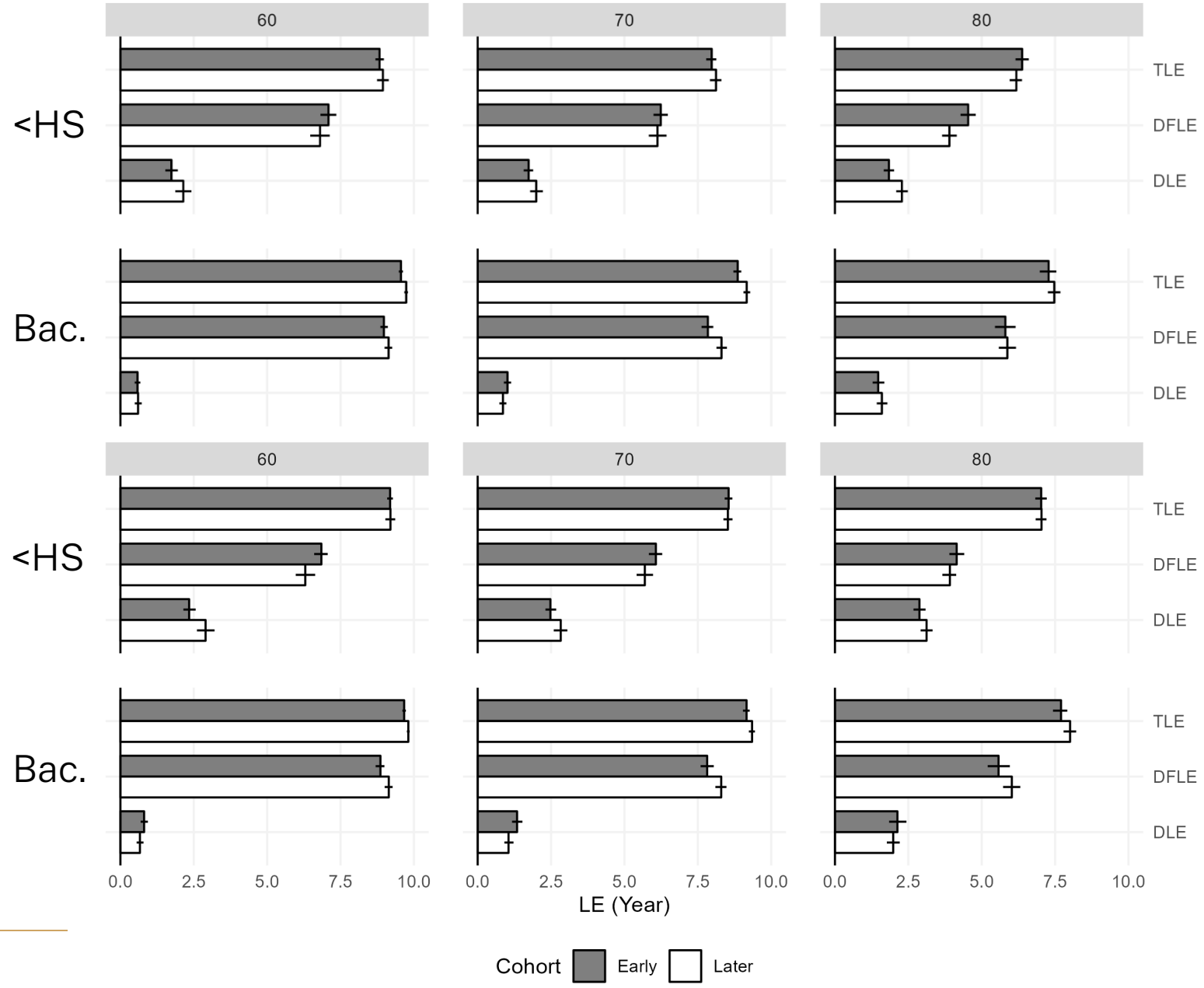


10 is the maximum LE between 60-69

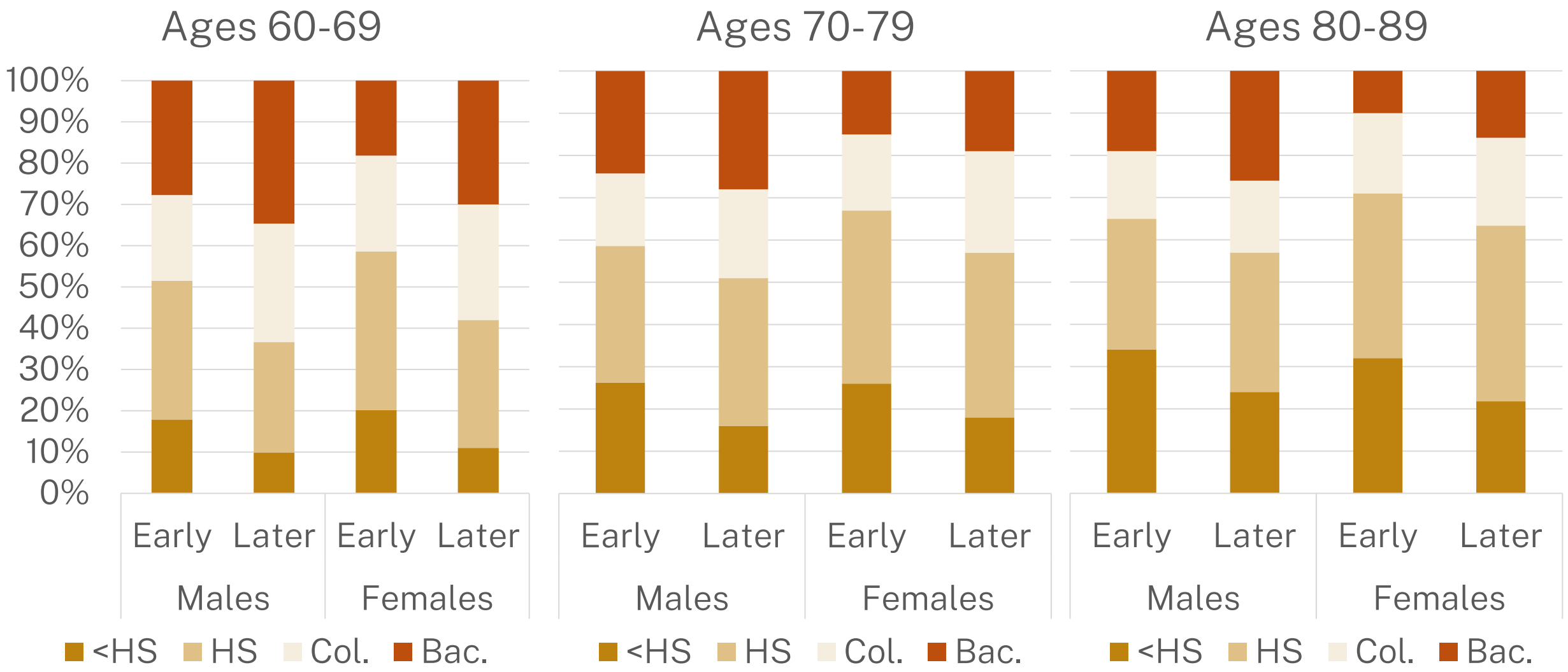
RESULTS BY EDUCATION (TLE, DFLE, DLE)

Males

Females



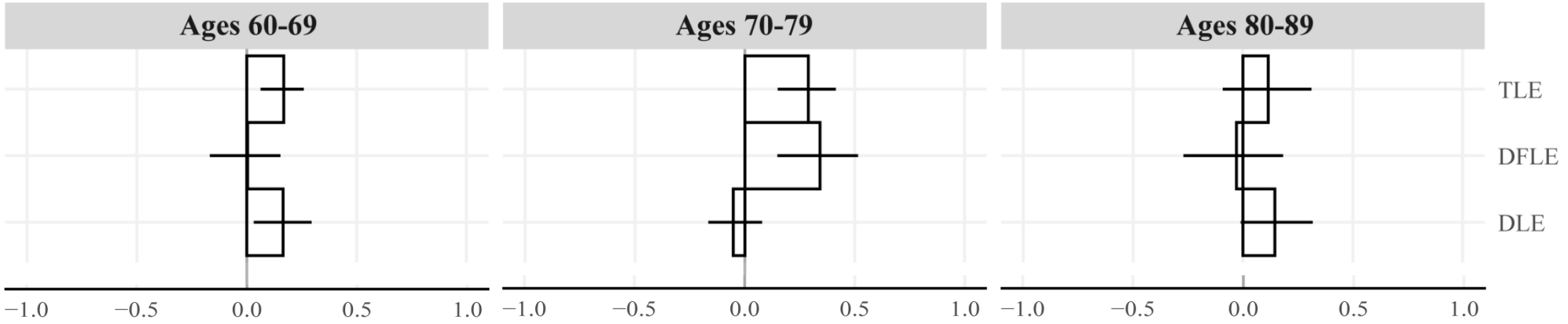
EDUCATIONAL COMPOSITION



RESULTS (Change in LE)

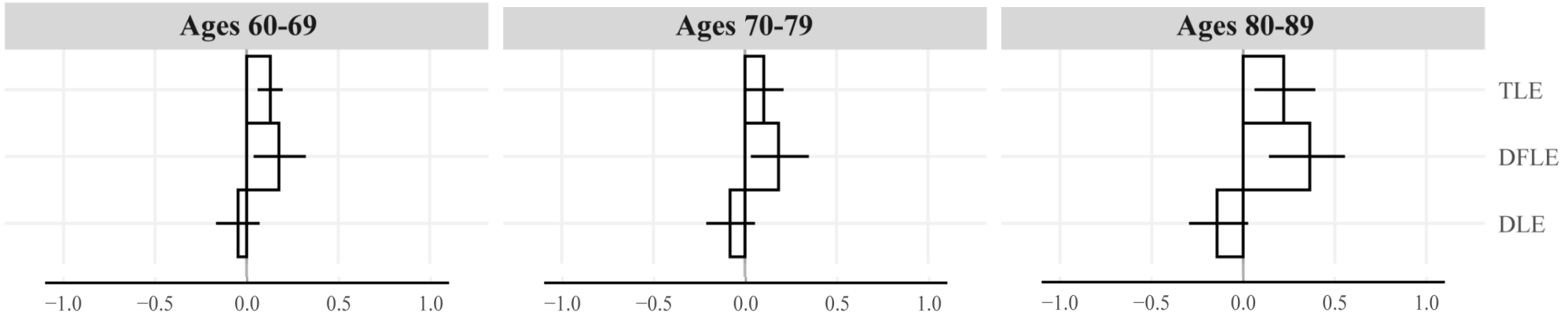
A Males

10-year change in LEs



B Females

10-year change in LEs



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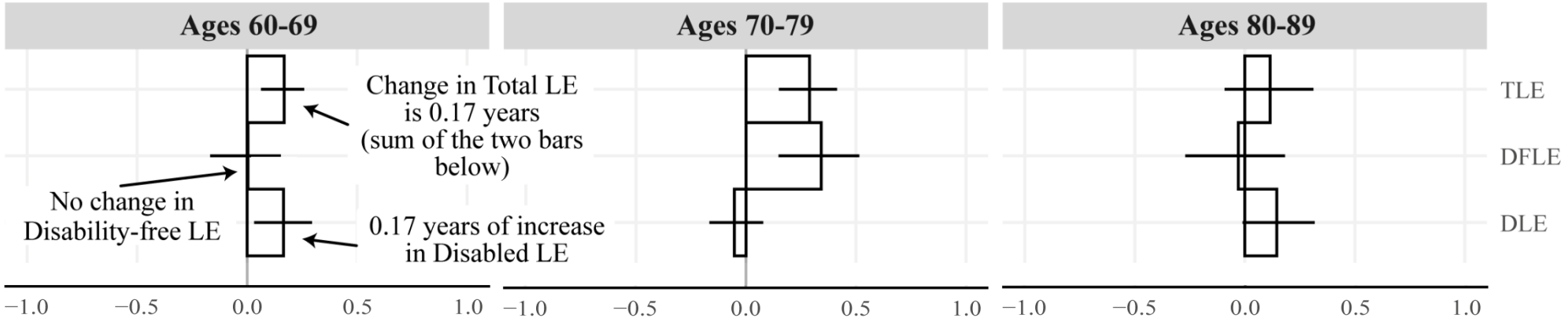

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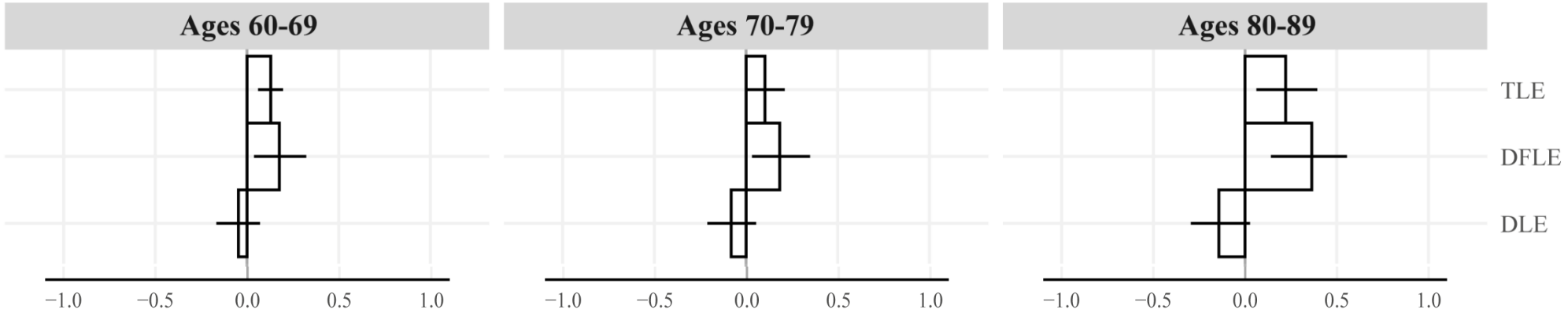
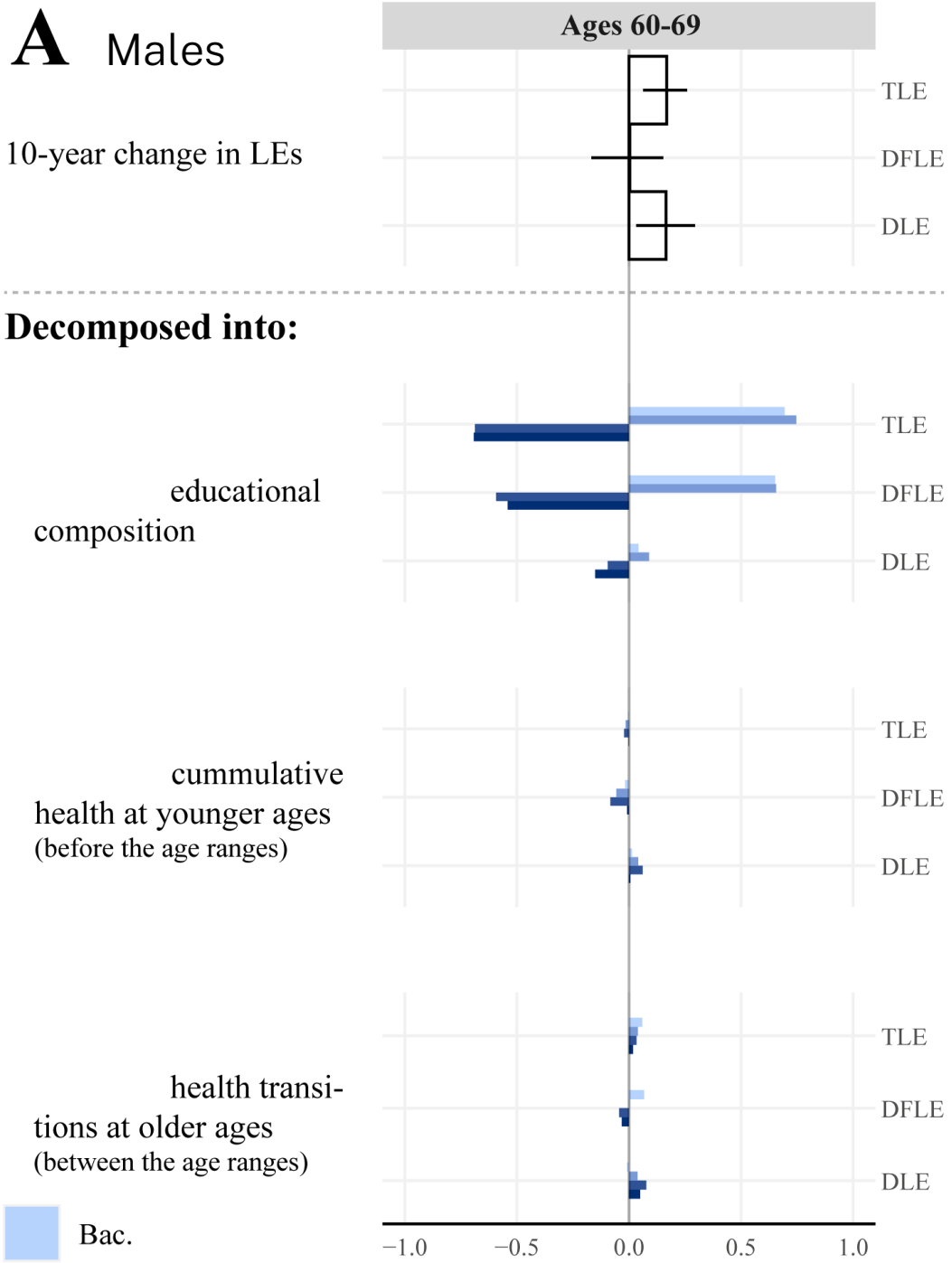
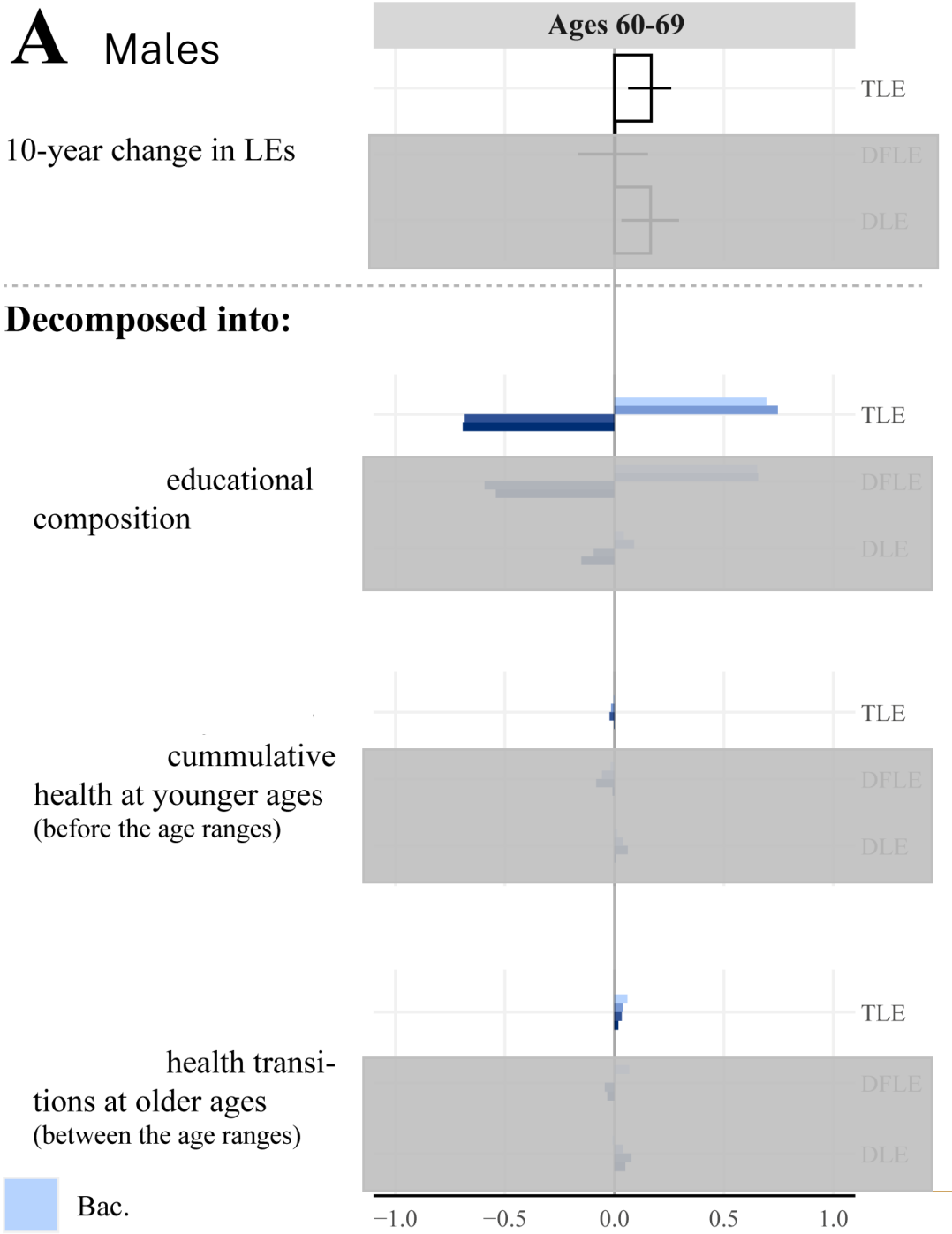


RESULTS (DECOMPOSED)



RESULTS (DECOMPOSED)

All the blue bars sum to the **black** bar



RESULTS (DECOMPOSED)

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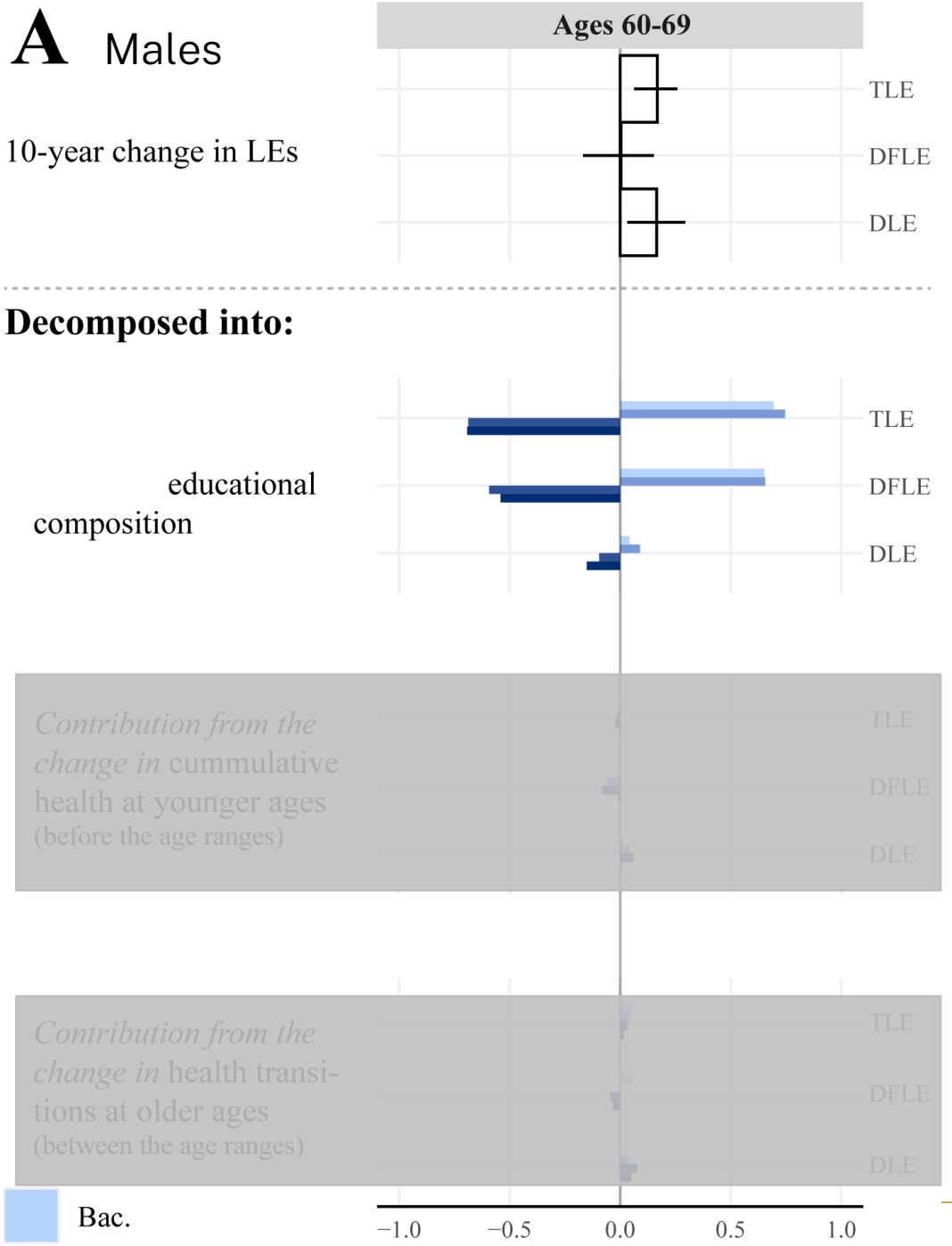
- The population is becoming more educated
  - As educated groups grow, they contribute more to population-level LE and health expectancies



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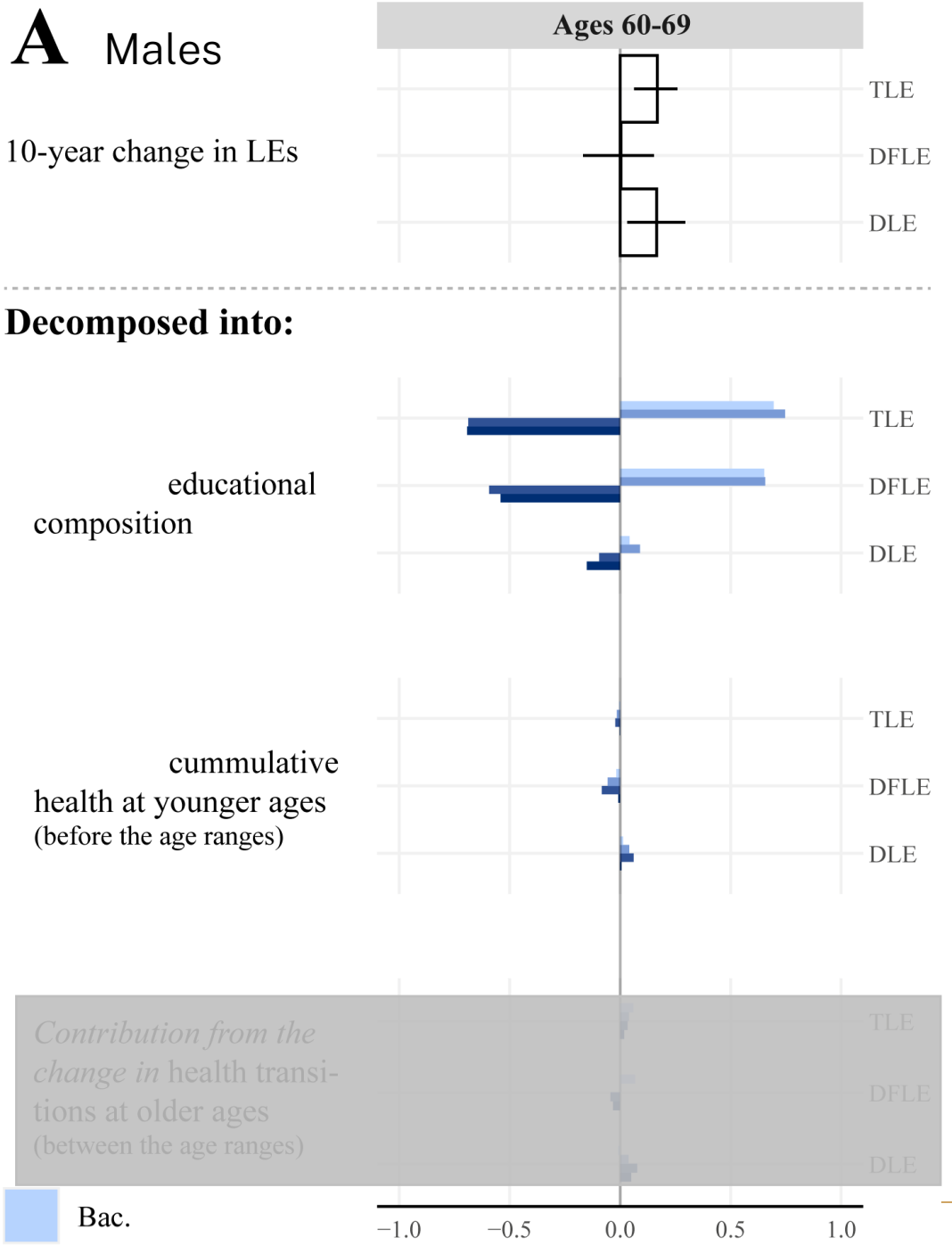
- Differences in cumulative health contribute slightly to the change
  - Little change from Bachelors and above



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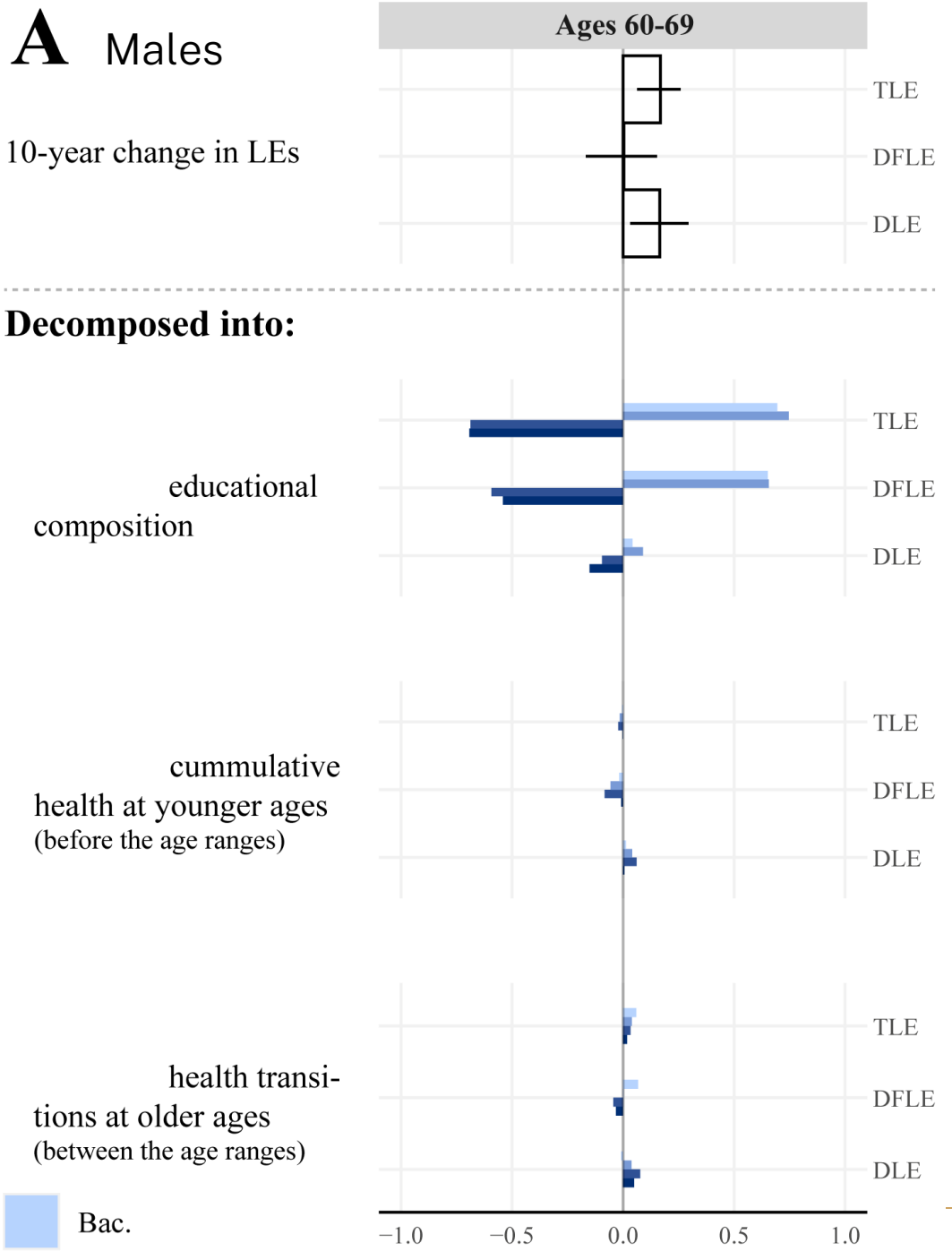
  - Little change from Bachelors and above
- Contribution from transition probability in older ages has an education gradient



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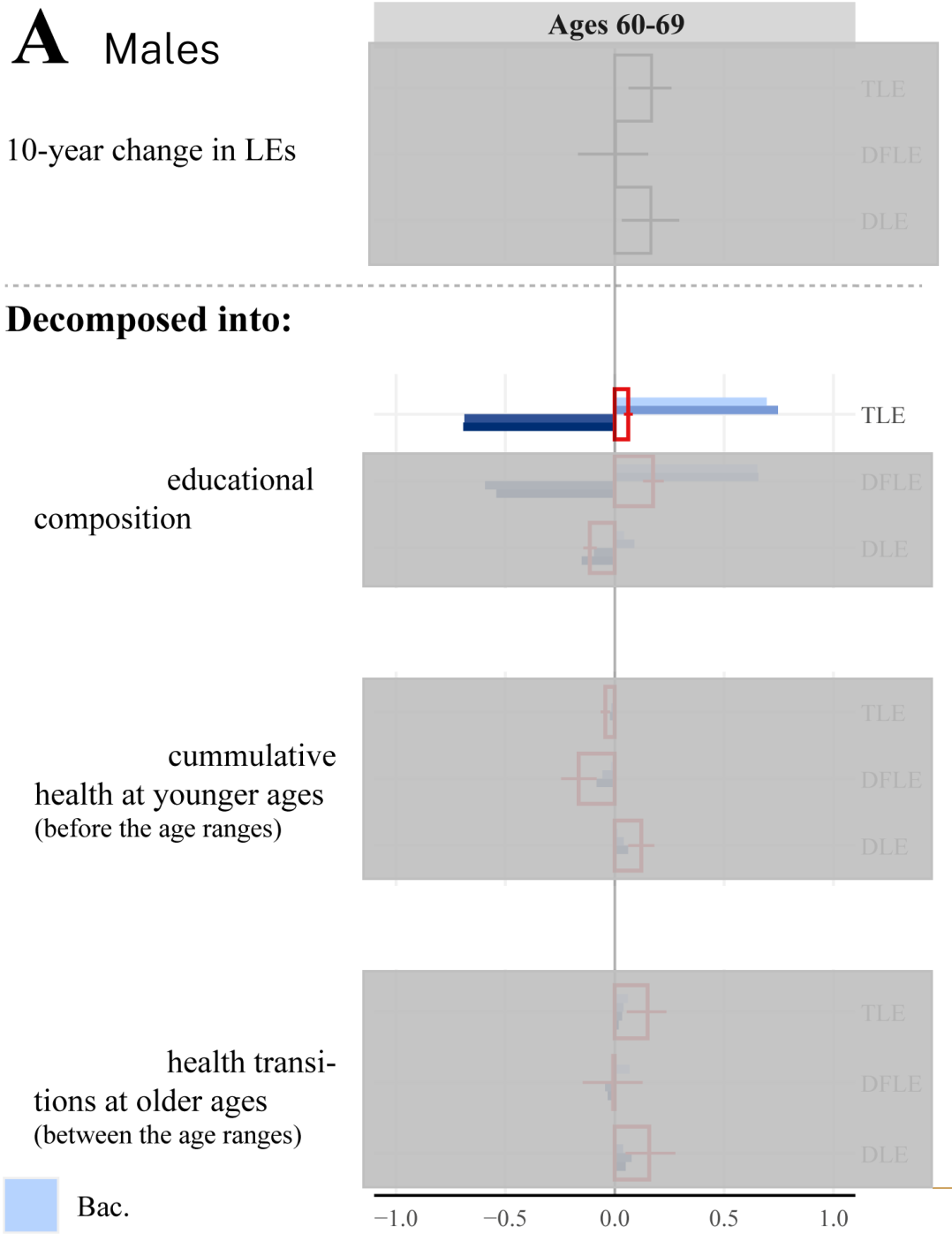

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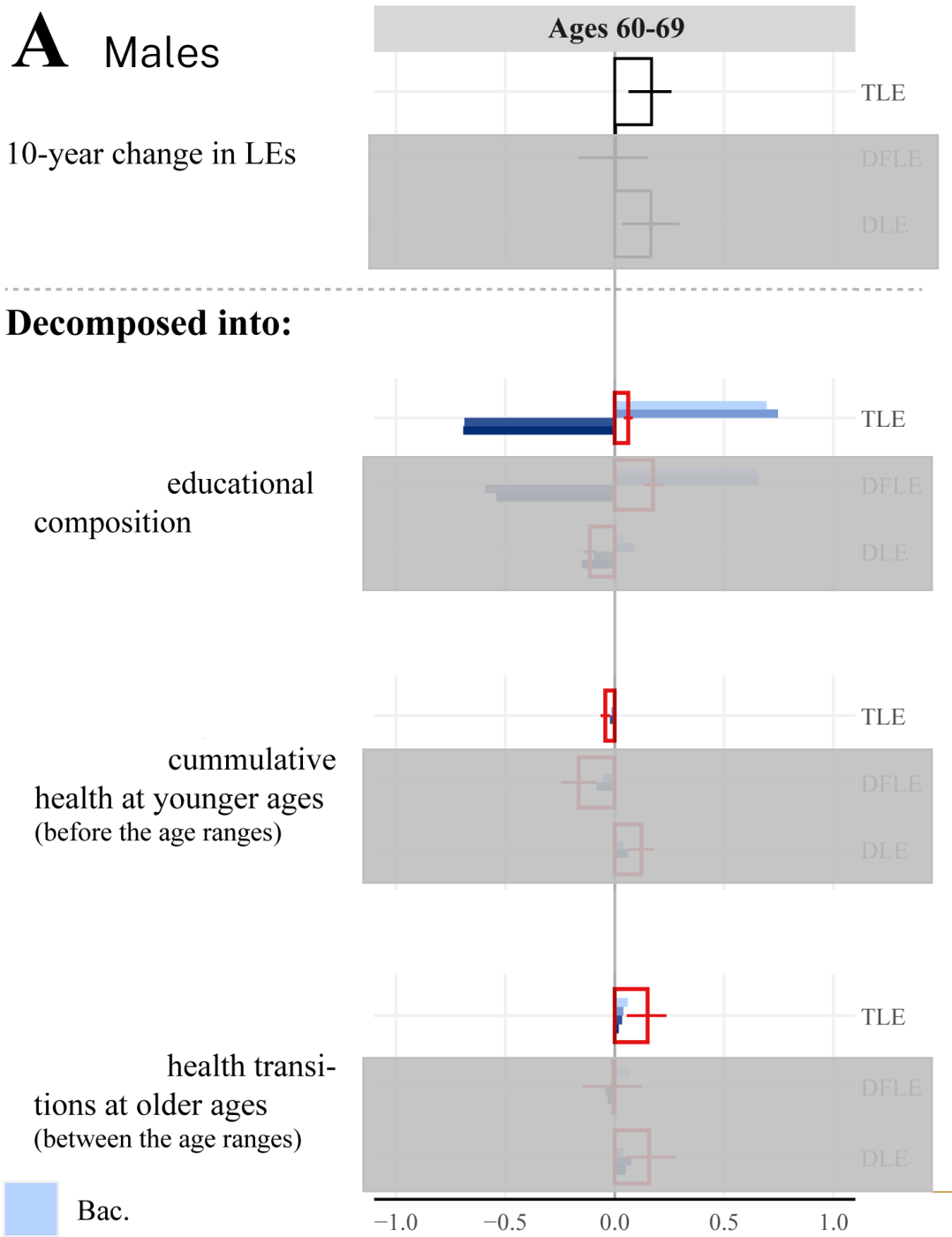

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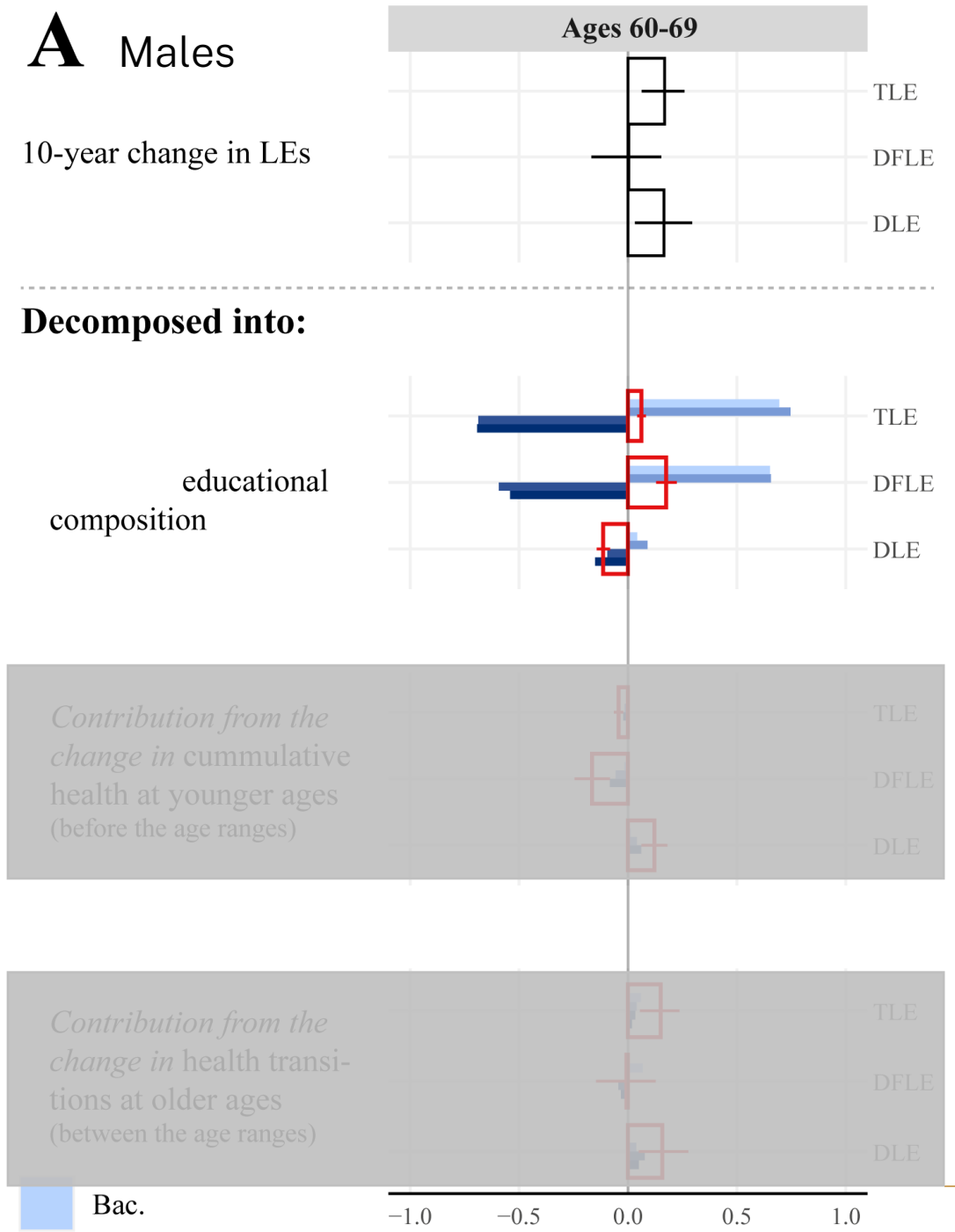
- The education composition contribute to most of the positive change in DFLE and TLE.



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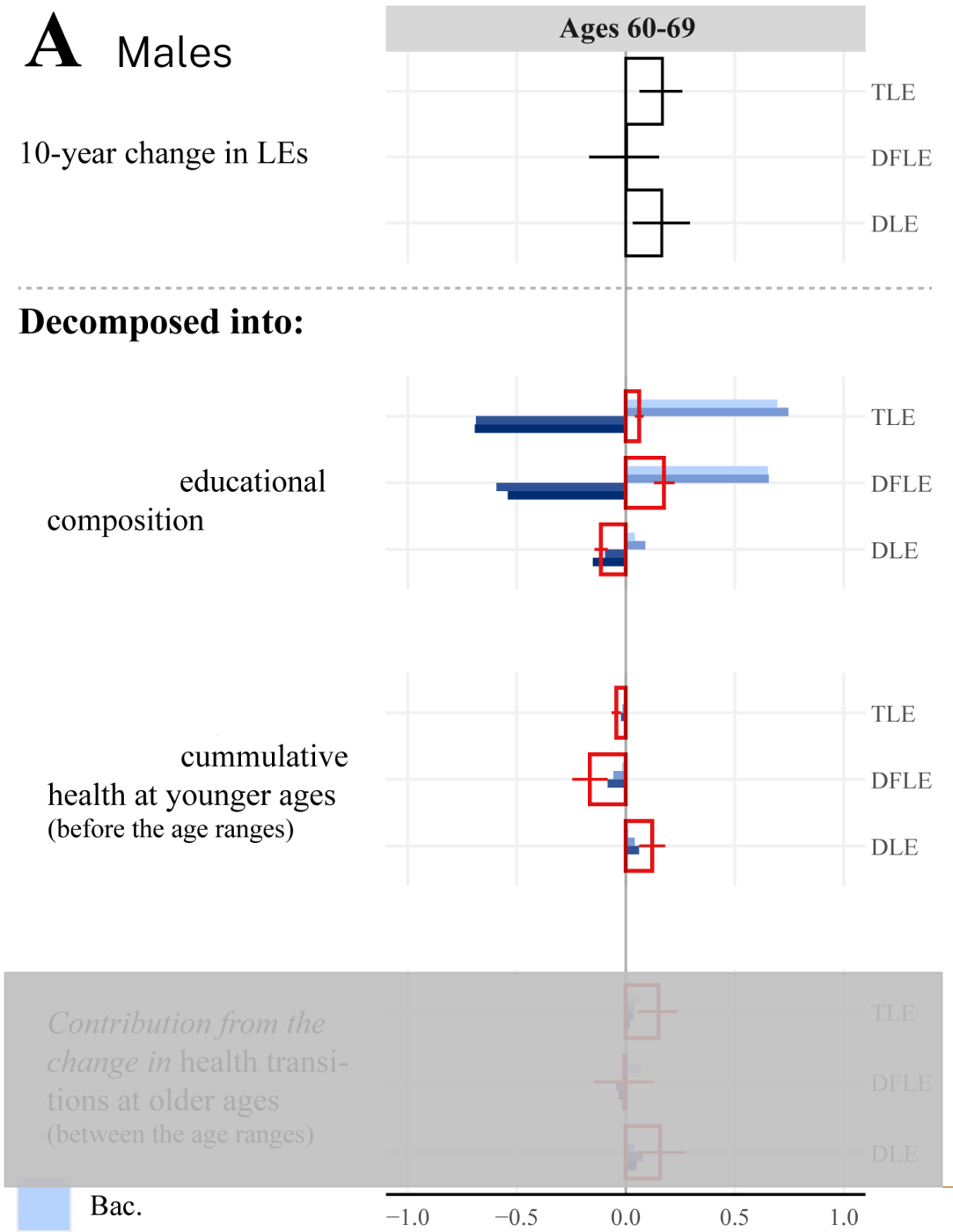
- The education composition contribute to most of the positive change in DFLE and TLE.
- The cumulative health seems to have a negative contribution to DFLE and positive to DLE



RESULTS (DECOMPOSED)

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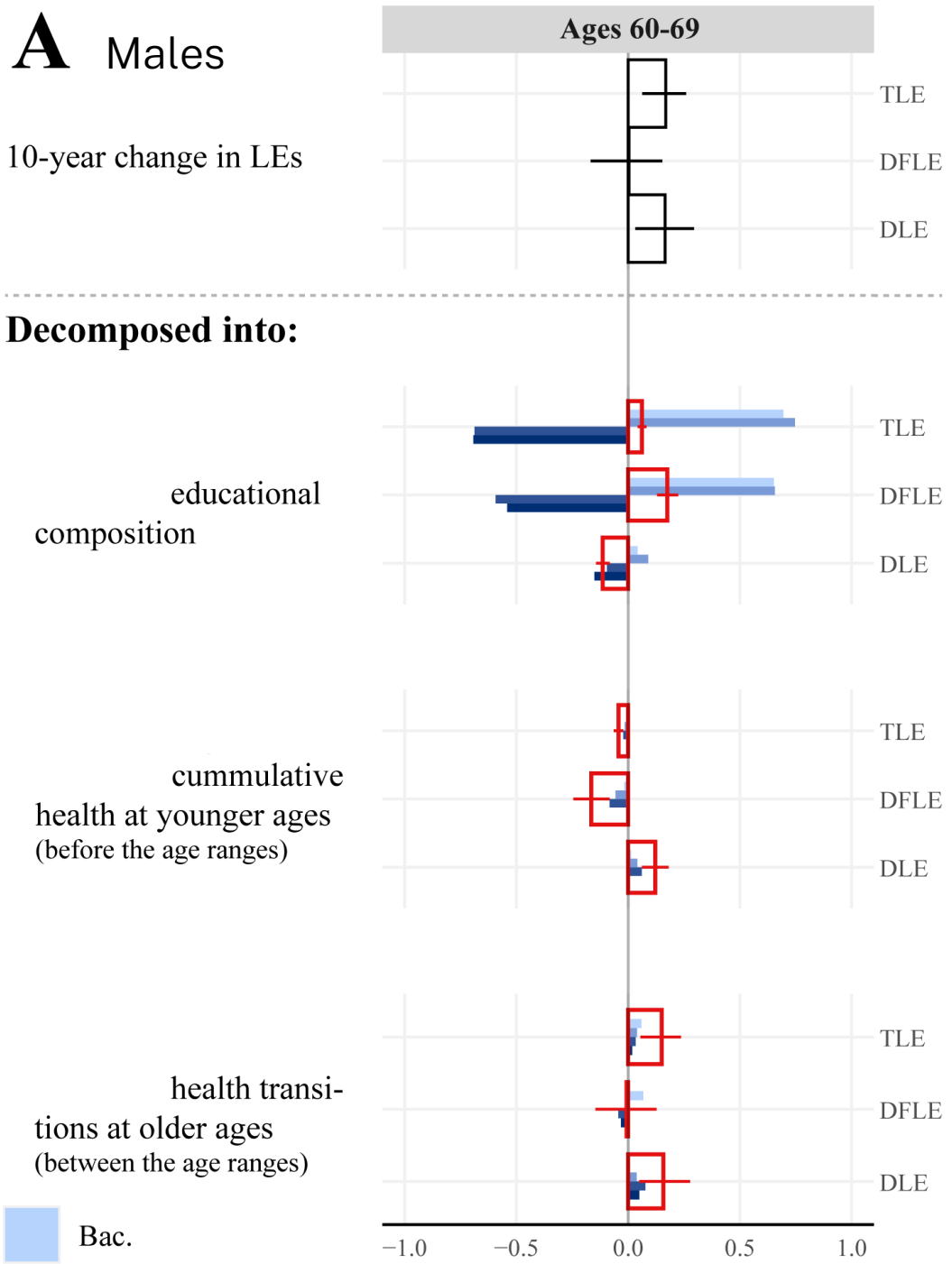
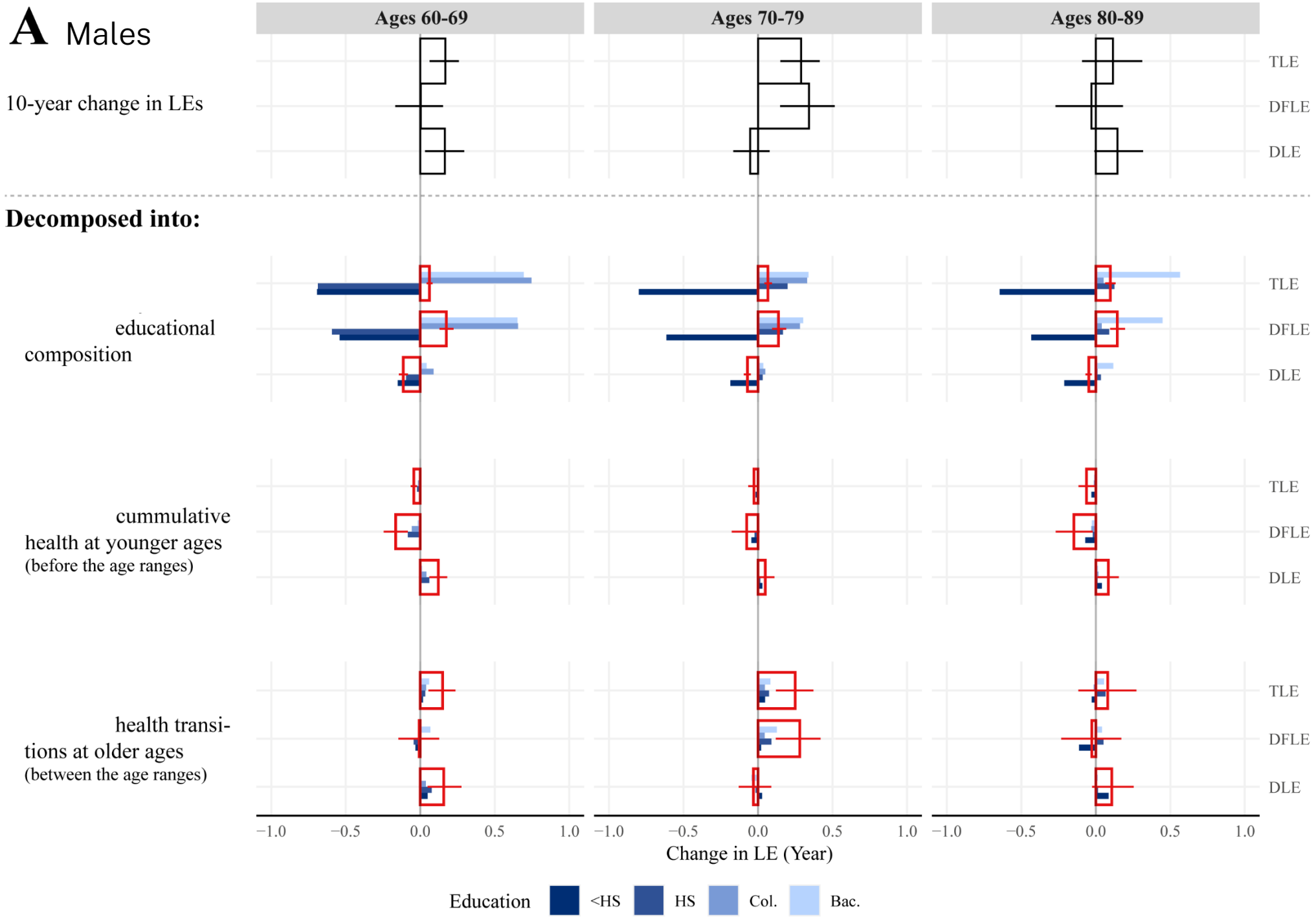
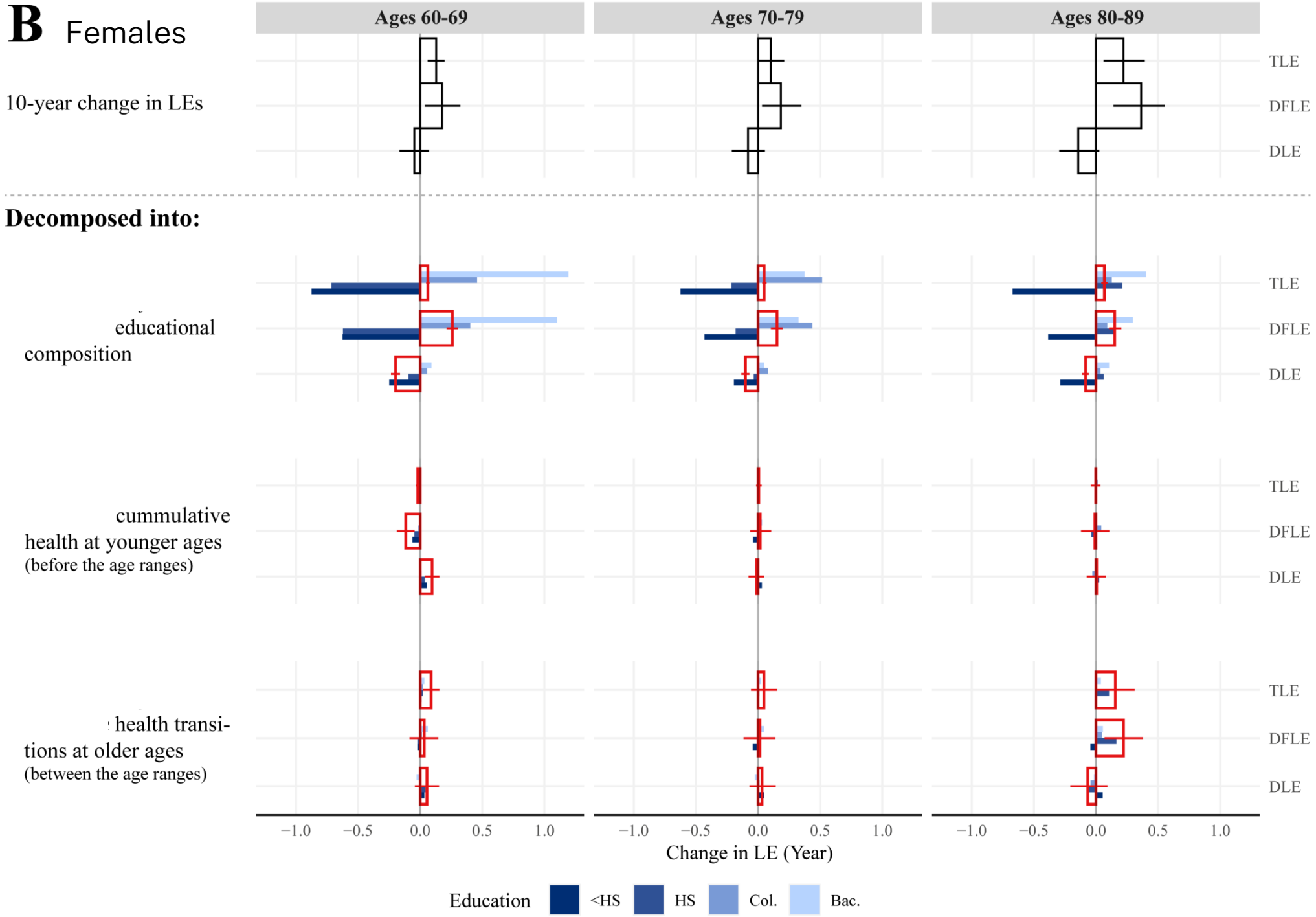
- The education composition contribute to most of the positive change in DFLE and TLE.
- The cumulative health seems to have a negative contribution to DFLE and positive to DLE
- Contribution from transition probability may contribute positively to DLE




A Males
Ages 60-69
Ages 70-79
Ages 80-89
10-year change in LEs
TLE
DFLE
DLE
Decomposed into:
educational composition
cummulative health at younger ages (before the age ranges)
health transi-tions at older ages (between the age ranges)
−1.0
−0.5
0.0
0.5
1.0
Change in LE (Year)
Education
<HS
HS
Col.
Bac.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Conclusion

- Total life expectancy generally increases over cohorts
- DLE has remained relatively stable (no compression of disability)

Changes in educational attainment across cohorts are a major factor contributing to the compression of disability

Why not seeing compression?

The widening of health disparities over cohort between educational groups has attenuated the potential positive change in population health from increasing educational attainment

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A DECOMPOSITION ANALYSIS OF US BIRTH COHORTS

Questions or comment:
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