Education-composition Effect On The Sex Gap In Life Expectancy:

Evidence from Australia

Wen Su[1], Jennifer Welsh[2], Rosemary J Korda[2], and Vladimir Canudas-Romo[1]

1. School of Demography, Australian National University, ACT, Australia
2. National Center for Epidemiology and Population Health, Australian National University, ACT, Australia

Australian National University

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Rationale

- How does life expectancy sex gap prevail across different sub-national levels in Australia?
- How does this dynamic at the sub-national level affect the life expectancy sex gap at the national level?

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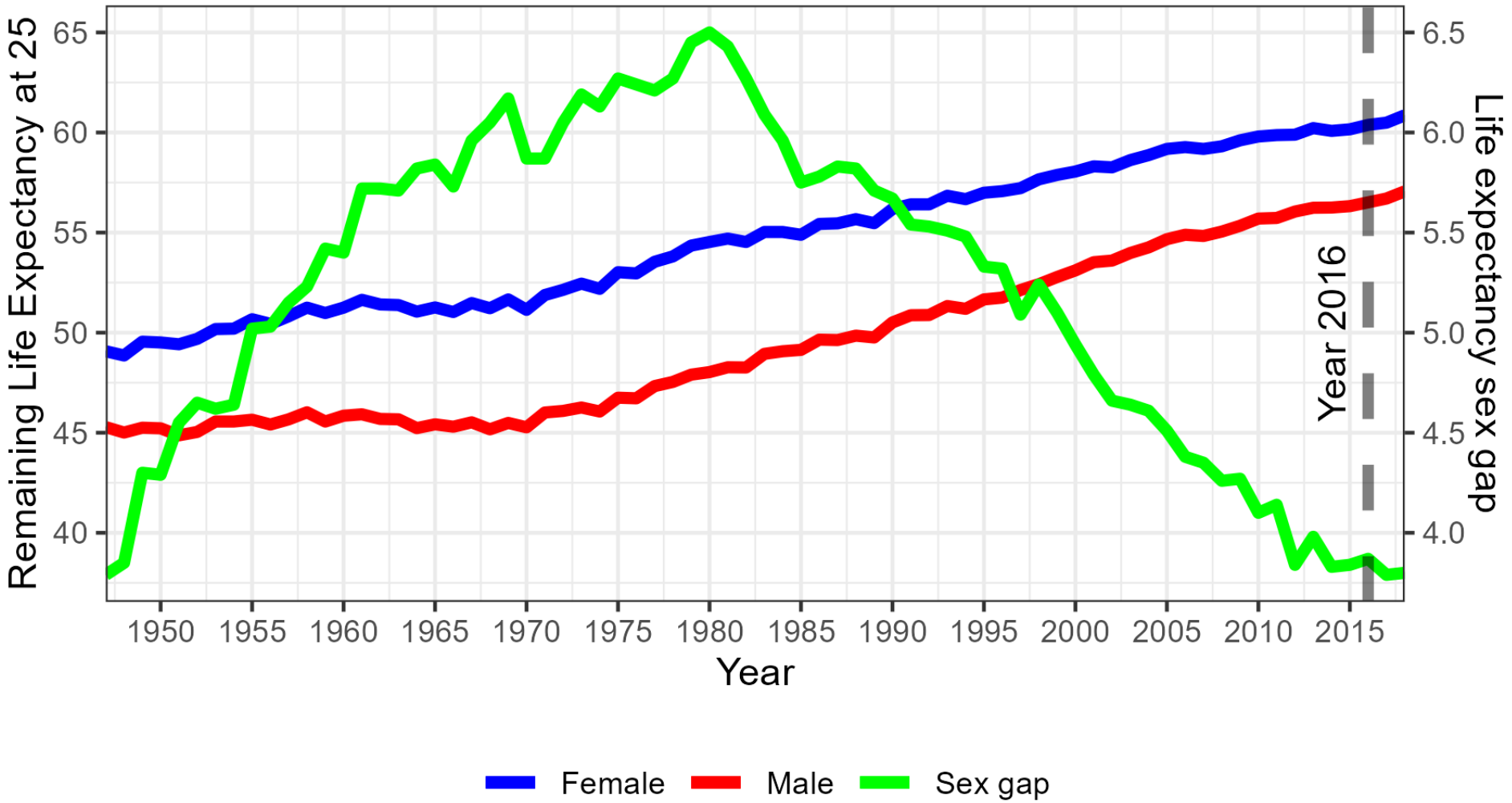
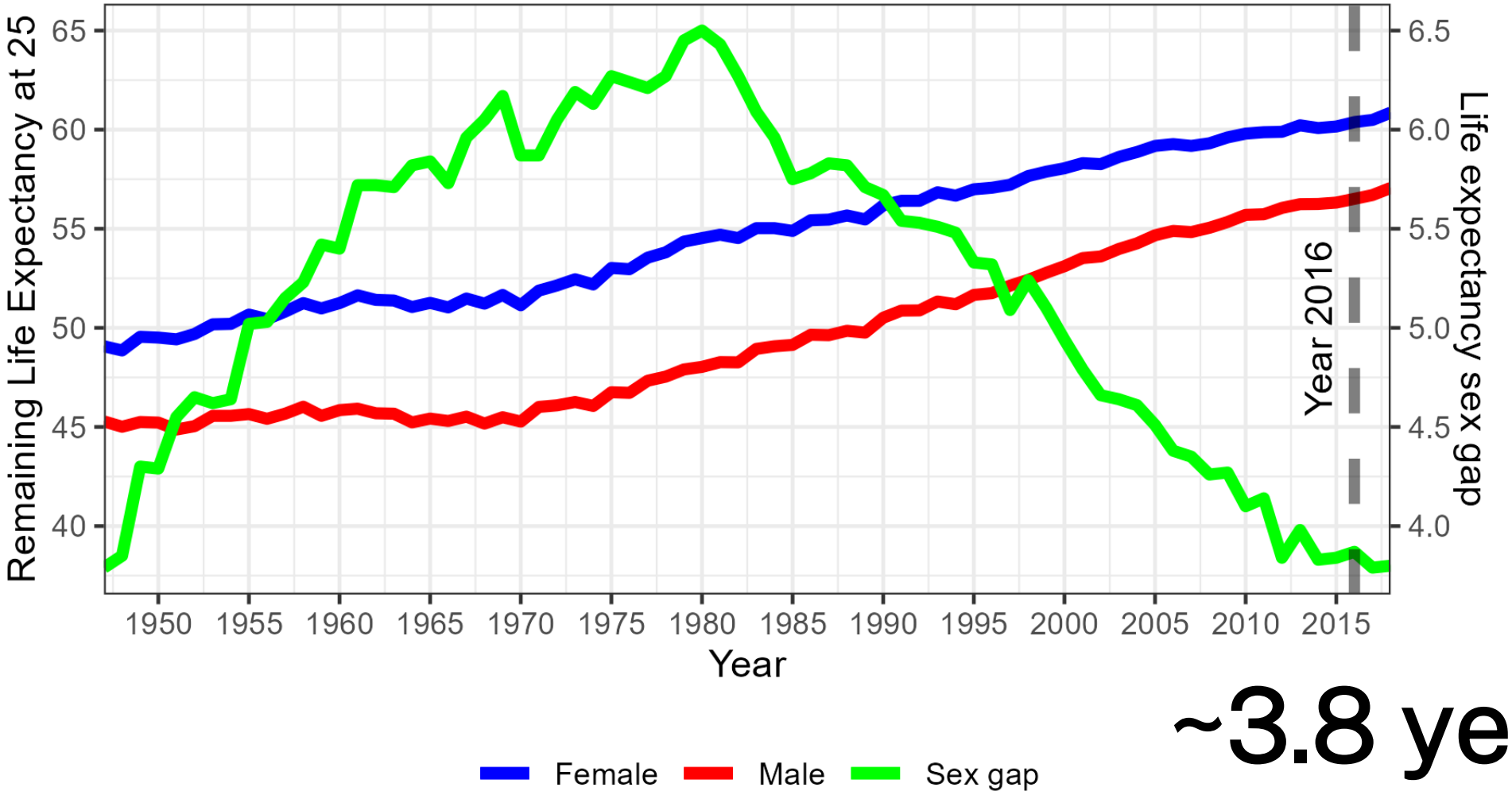
Remaining Life expectancy at 25 and Sex Gap Trends, Australia 2016



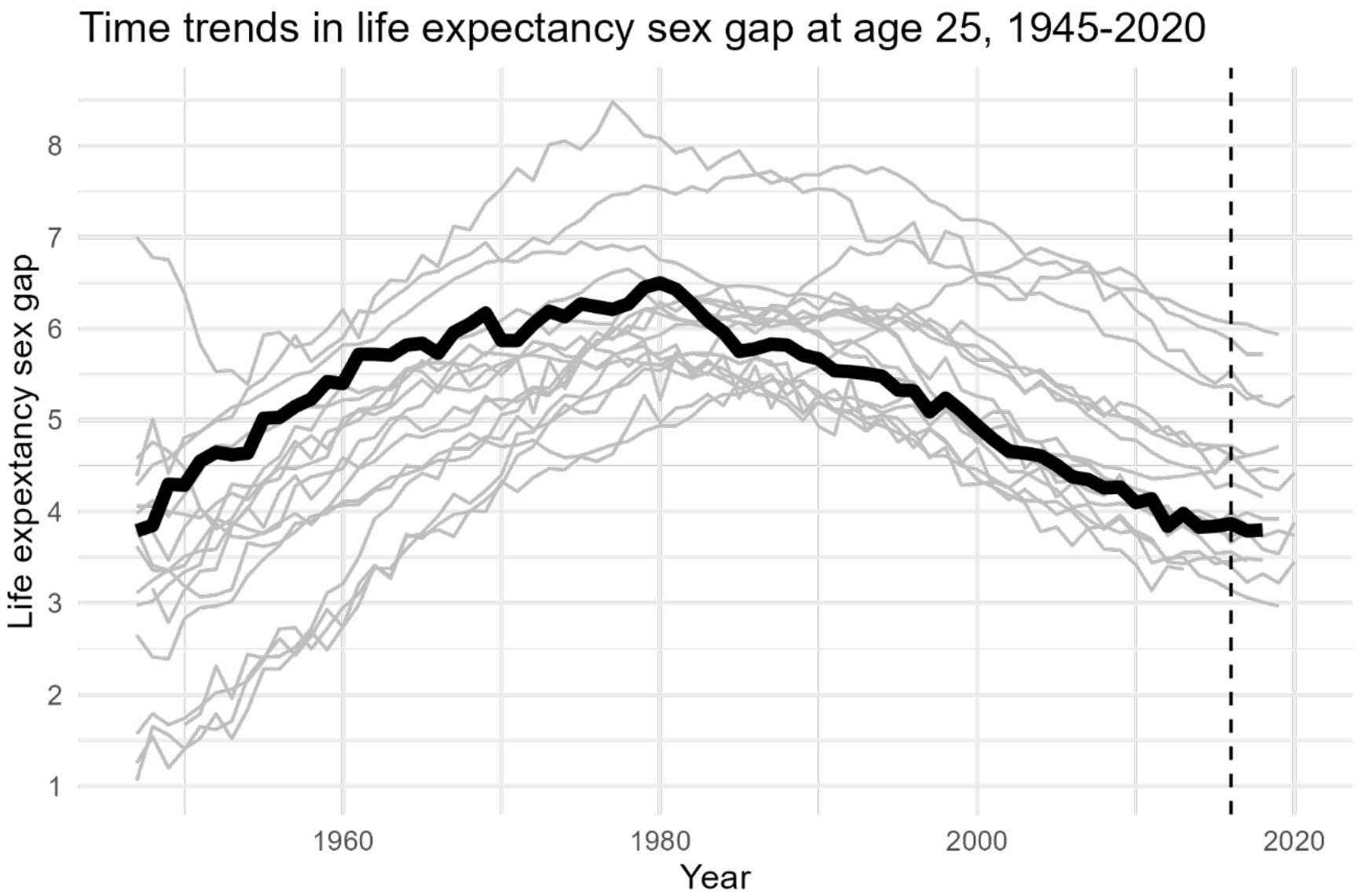
Source: Calculation based on HMD(2021)

Remaining Life expectancy at 25 and Sex Gap Trends, Australia 2016



~3.8 years

Source: Calculation based on HMD(2021)



Source: Calculation based on HMD(2021)

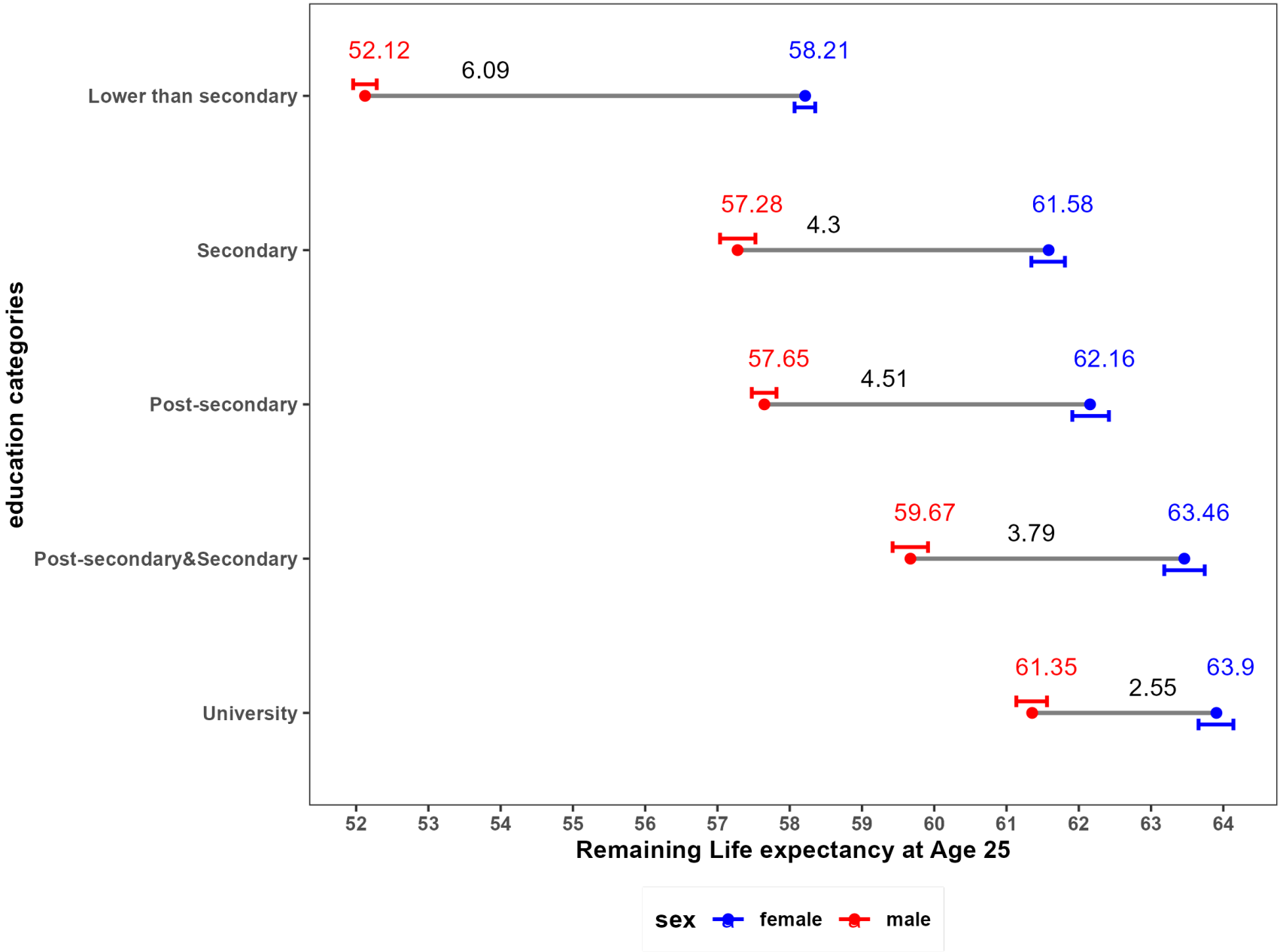
Looks good, but?

Data

Death registration in 2016-2017 linked to Census 2016 results through Multi-Agent Data Integration Project (MADIP) (Korda et al., 2020; Welsh et al., 2021)

Number of deaths and Population estimates for each education levels smoothed with Penalized-composite link model (Rizzi et al., 2015).

Why Education?



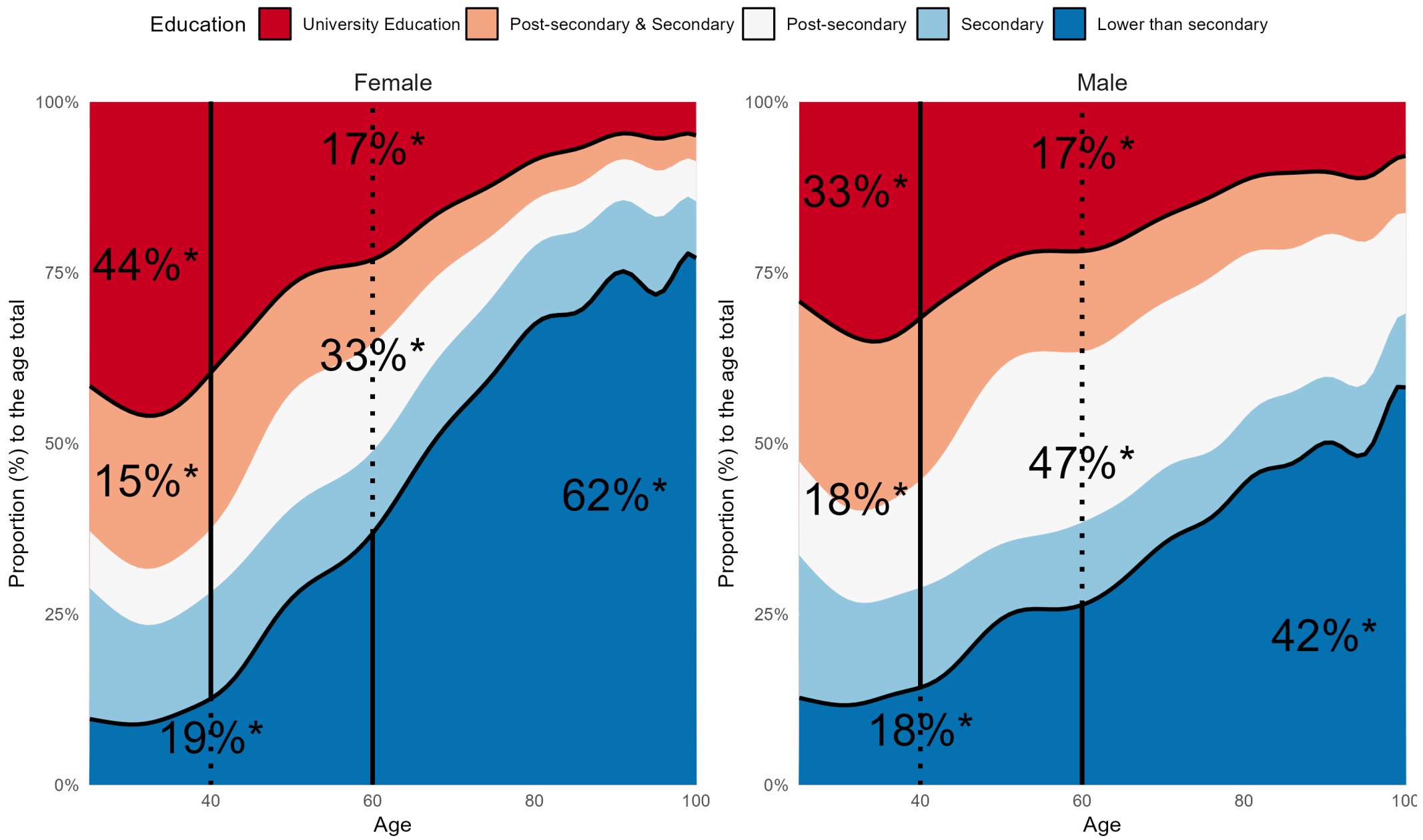
Life expectancy sex gap by education level, 2016

Source: MADIP (2021)

Methods

$$m(x) = \sum_i m(x,i)c(x,i)$$

$m(x,i)$ is sub-population-specific mortality rates, and $c(x,i)$ is sub-population composition



Source: Calculation based on MADIP (2021)

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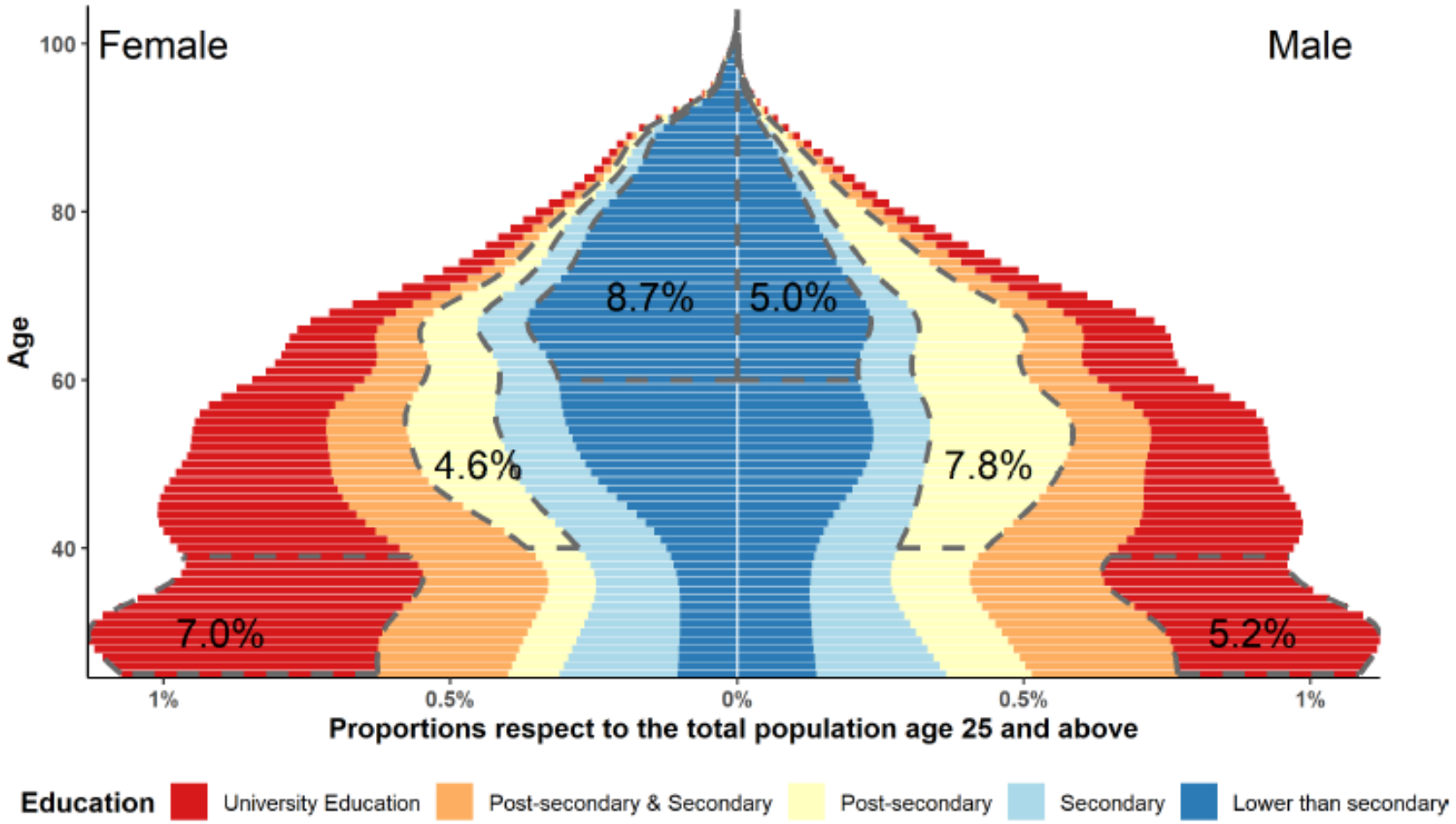

Figure 1. Population pyramid from age 25 by education level, Australia 2016

Source: Calculation based on MADIP (2021)

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How would this change anything?

$$\dot{e}_{25} = \Delta\, mortality + \Delta\, composition$$

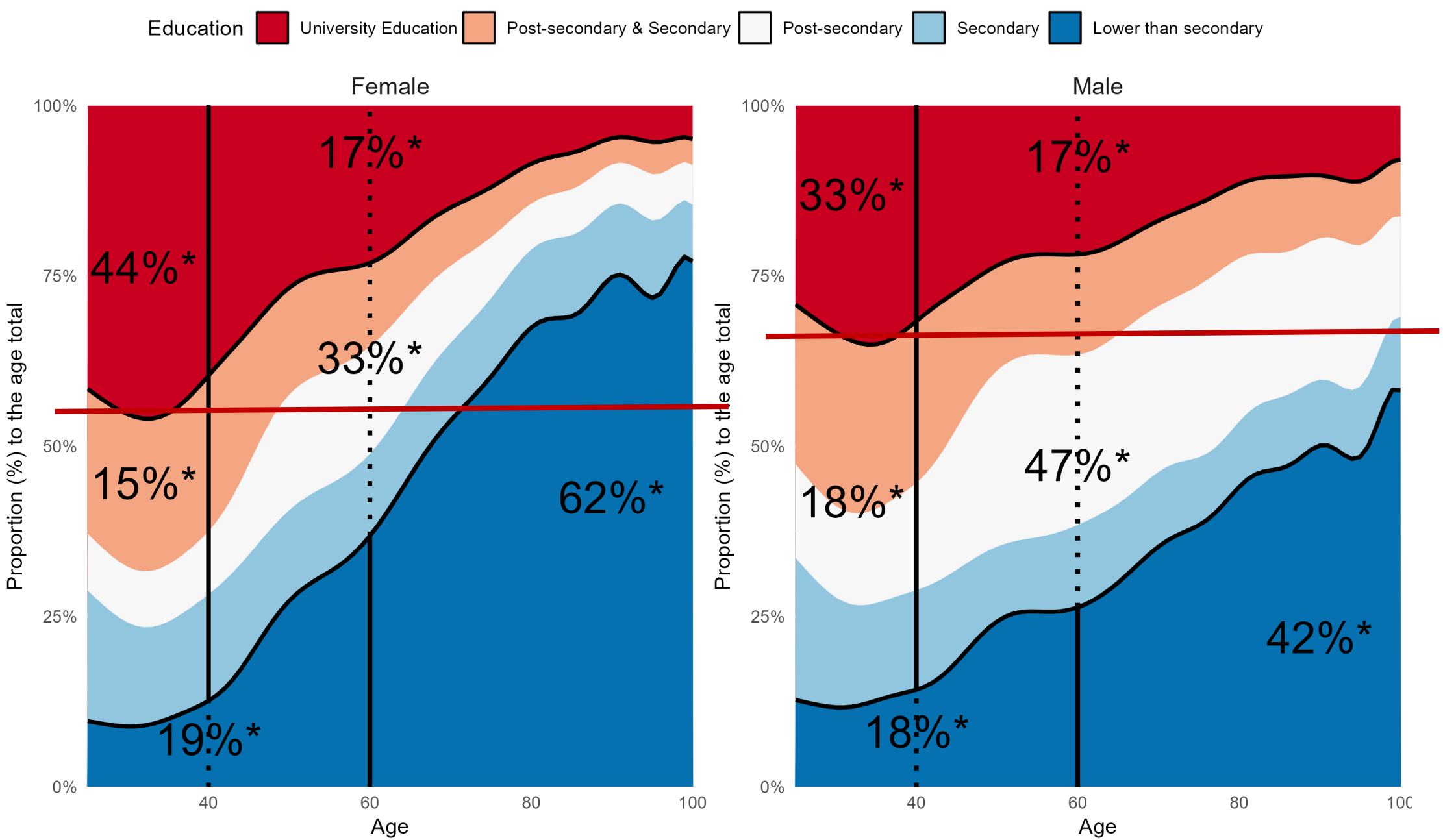
$$\dot{e}_{25} =$$

$$-\int_{25}^{\omega} \sum_i e^{-\int_{25}^{x} \sum_i m_{a,i} c_{a,i}\, da} \int_{25}^{x} \dot{m}_{a,i} c_{a,i}\, da\, dx$$

$$-\int_{25}^{\omega} \sum_i e^{-\int_{25}^{x} \sum_i m_{a,i} c_{a,i}\, da} \int_{25}^{x} m_{a,i} \dot{c}_{a,i}\, da\, dx$$

	A. Australia 2016
Female life expectancy	*59.91 (59.84, 59.97)*
Male life expectancy	*56.06 (56.00, 56.13)*
Δ *Mortality*	*4.45 (4.36, 4.54)*
Δ *Composition*	*-0.67 (-0.67, -0.66)*
Total	*3.78 (3.69, 3.87)*

The negative composition effect


Education
University Education
Post-secondary & Secondary
Post-secondary
Secondary
Lower than secondary
Female
Male
100%
75%
50%
25%
0%
Proportion (%) to the age total
17%*
44%*
33%*
15%*
62%*
19%*
33%*
17%*
18%*
47%*
42%*
18%*
40
60
80
100
Age

	B. Hypothetical Scenario
Female life expectancy	*61.86 (61.80, 61.91)*
Male life expectancy	*57.71 (57.64, 57.77)*
Δ *Mortality*	*3.73 (3.65, 3.82)*
Δ *Composition*	*0.41 (0.40, 0.41)*
Total	*4.14 (4.05, 4.23)*

Increasing life expectancy.

Widening gap and positive composition effect.

Discussion

1. The importance of SES composition (e.g. education, income, occupation).
2. Possible scenario for the future
3. Heterogeneity, and making public health observations.

Future Directions

Differences across time?

Impact from pandemic?

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