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FOR DEMOGRAPHIC  
RESEARCH

# Healthy Life Expectancy, Mortality, and Age Prevalence of Morbidity

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HLE most often measured by Sullivan method

$$\text{HLE} = \int \ell(x) (1 - \pi(x)) \, dx$$

# Ergo *age* patterns

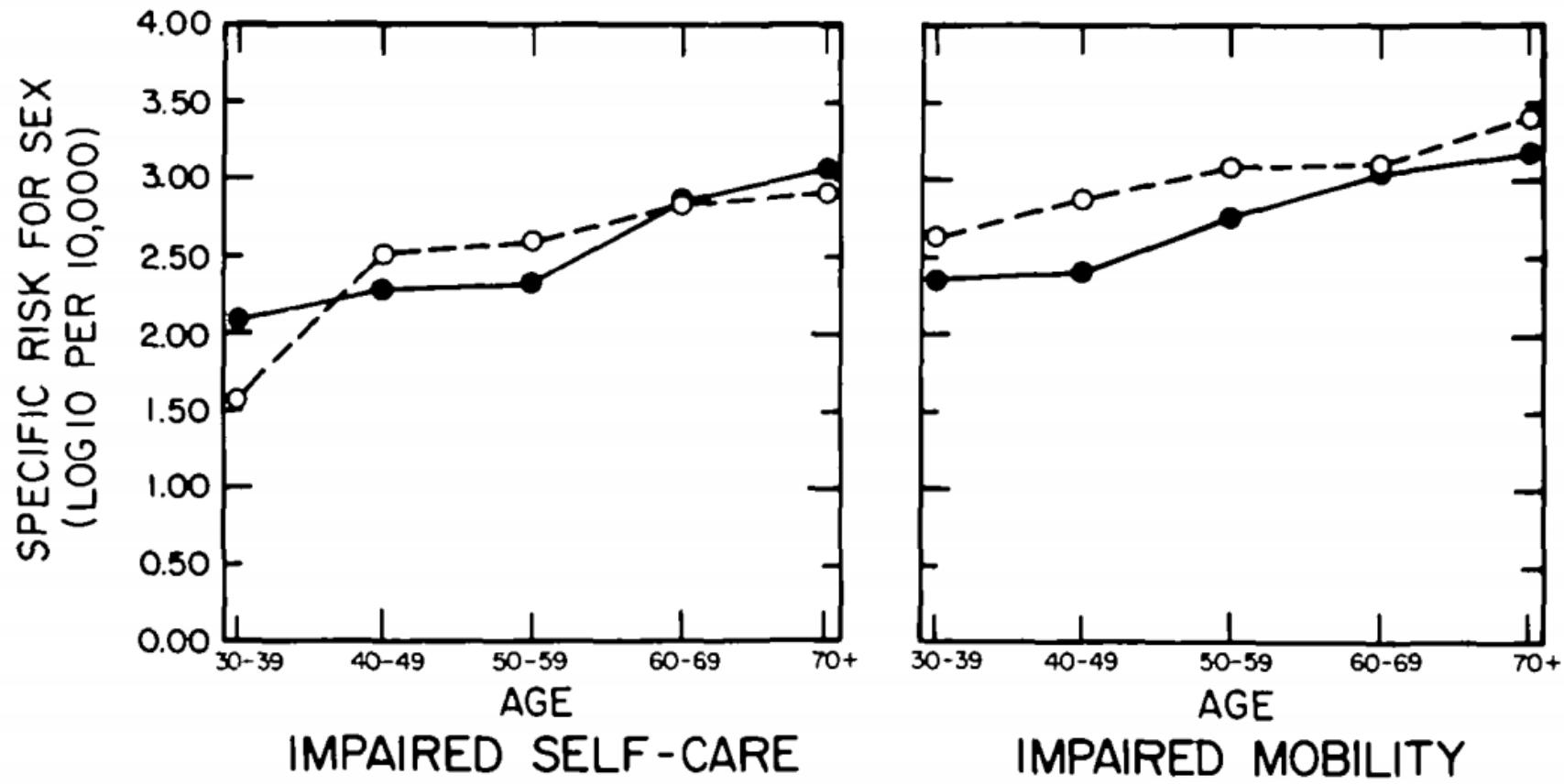


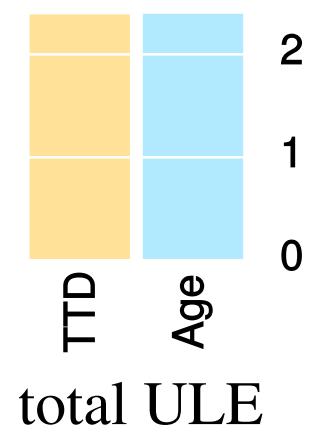
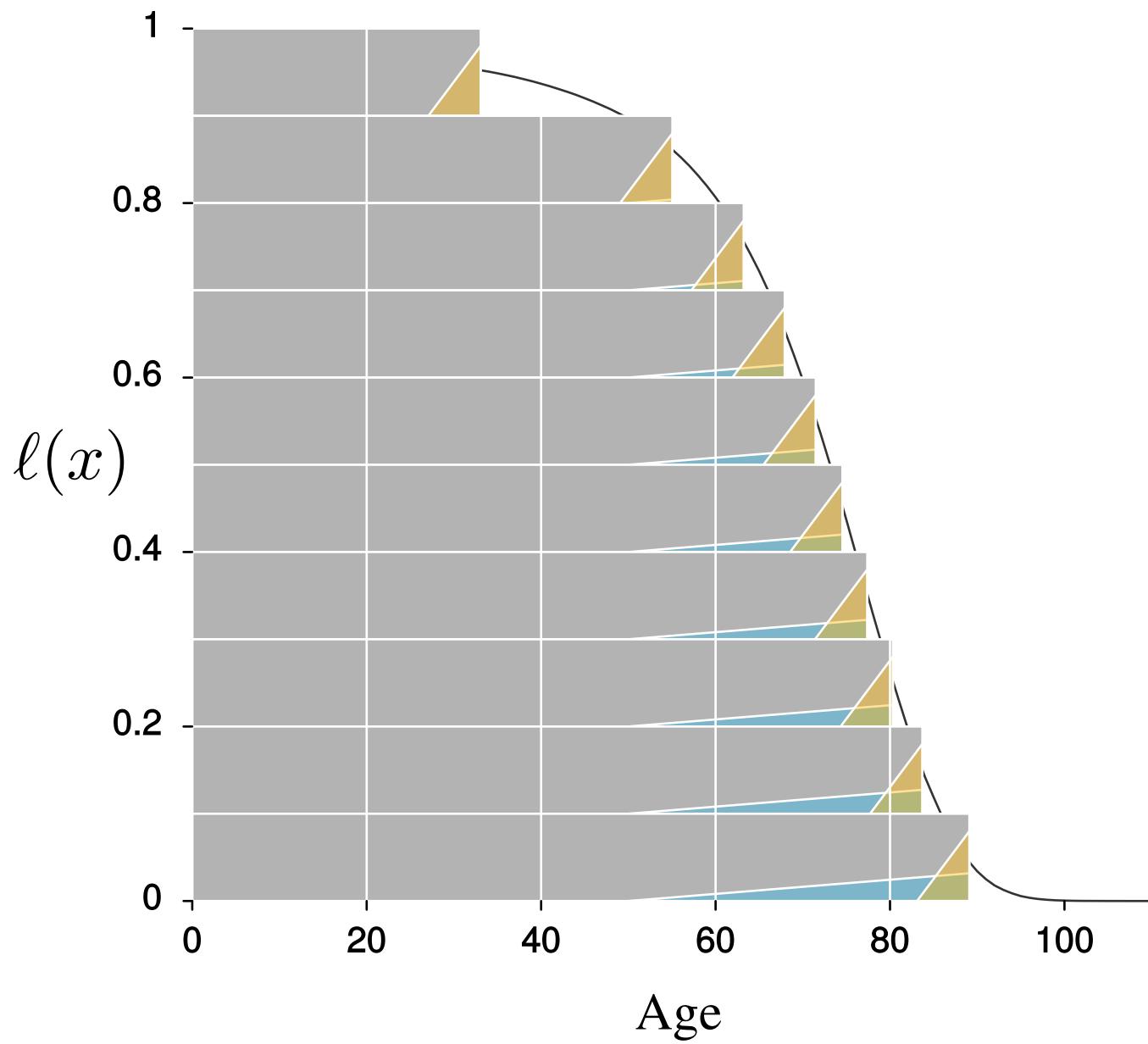
FIGURE 5. Sex-specific risks of 9-year functional disability (6 months or longer duration) by age, Alameda County, California, 1965-1974. ●, men; ○, women.

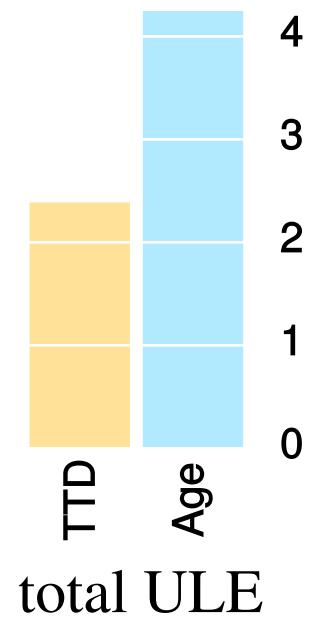
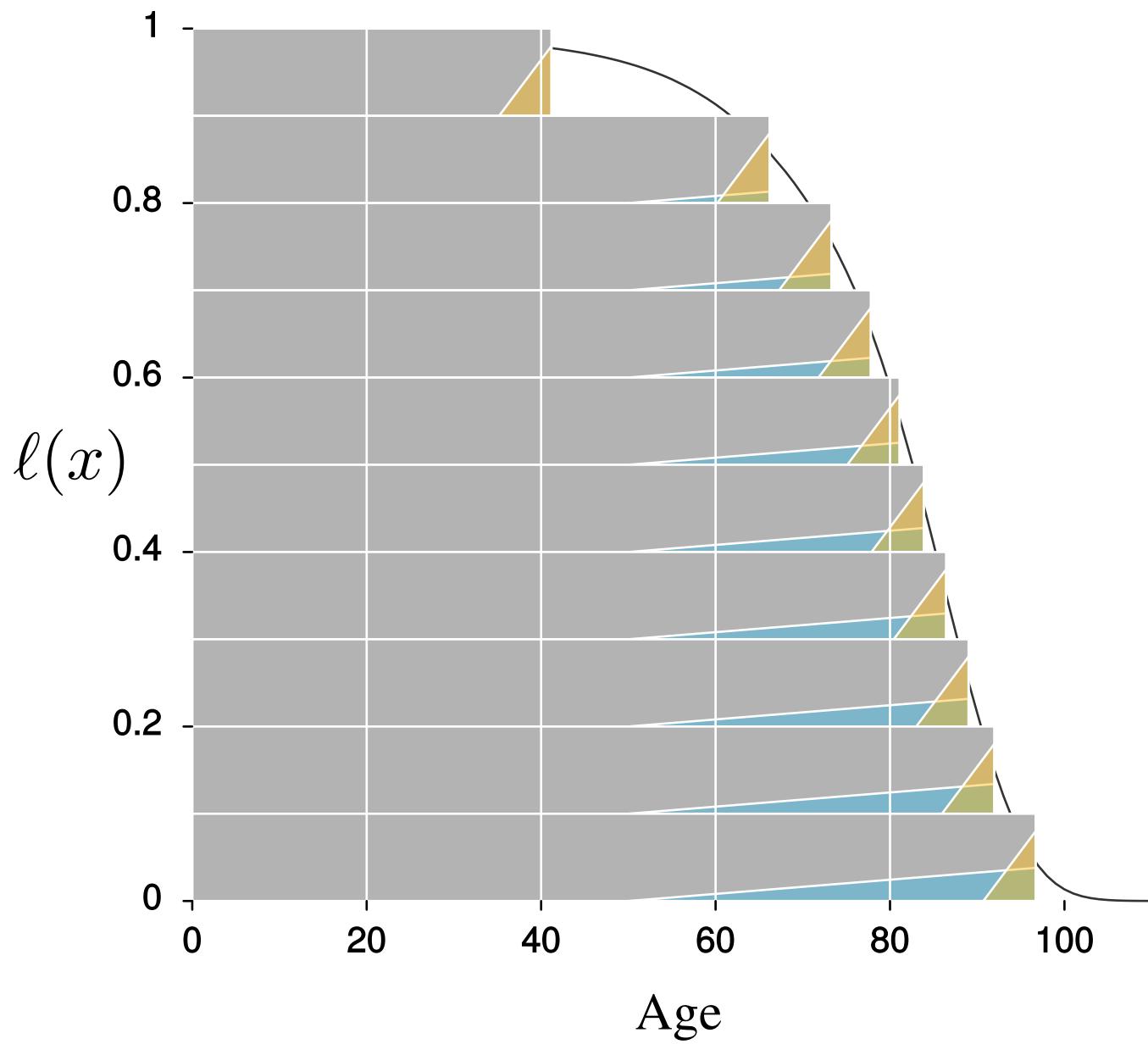
Wingard et al. (1989)

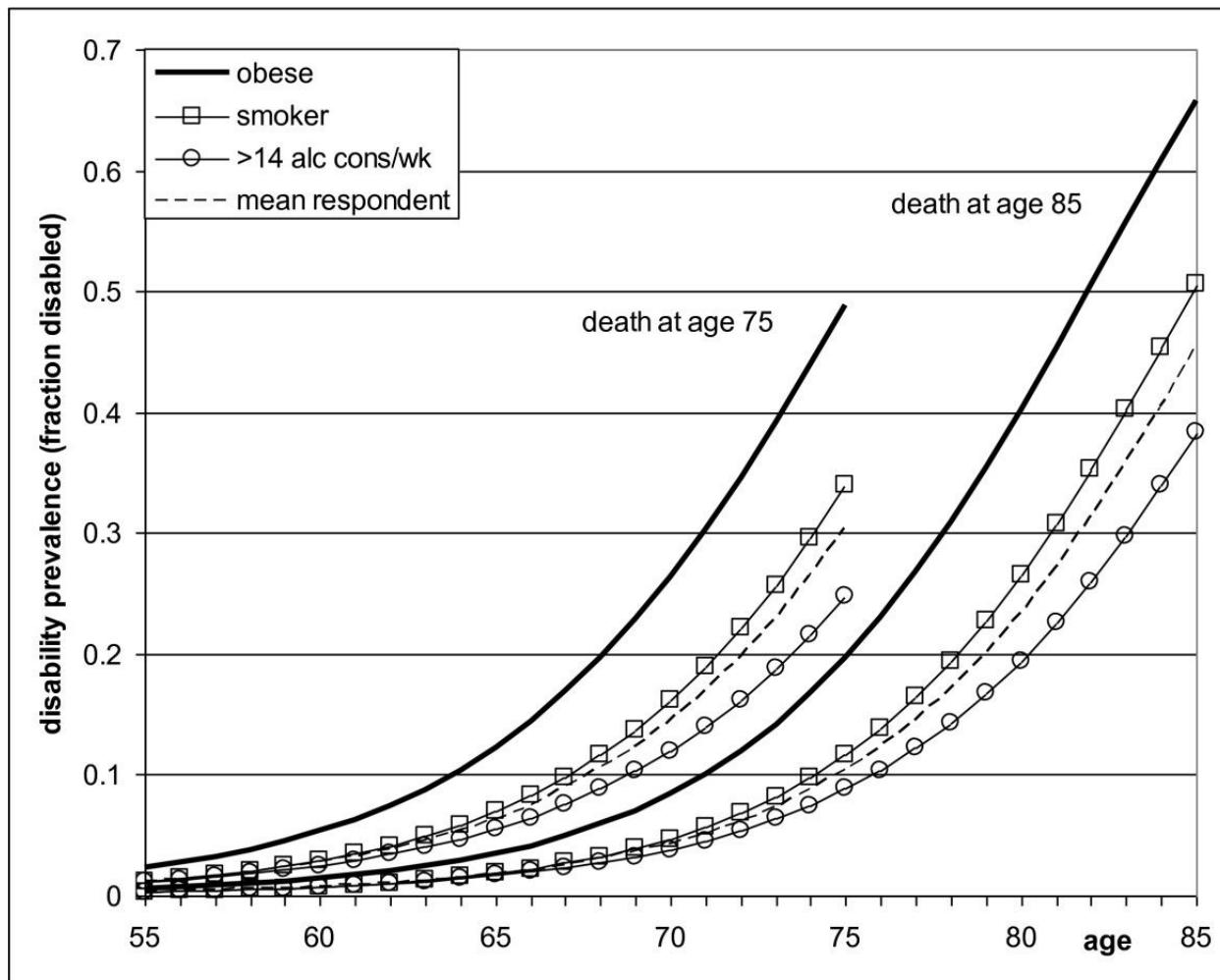
- Stock variable, changes slowly (Barendregt et al. 1994)
- Prevalence can vary by age, time-to-death, lifespan, or combinations of these things (Riffe et al. 2017).
- Complicates comparisons of period HLE (or ULE) across populations with different mortality.

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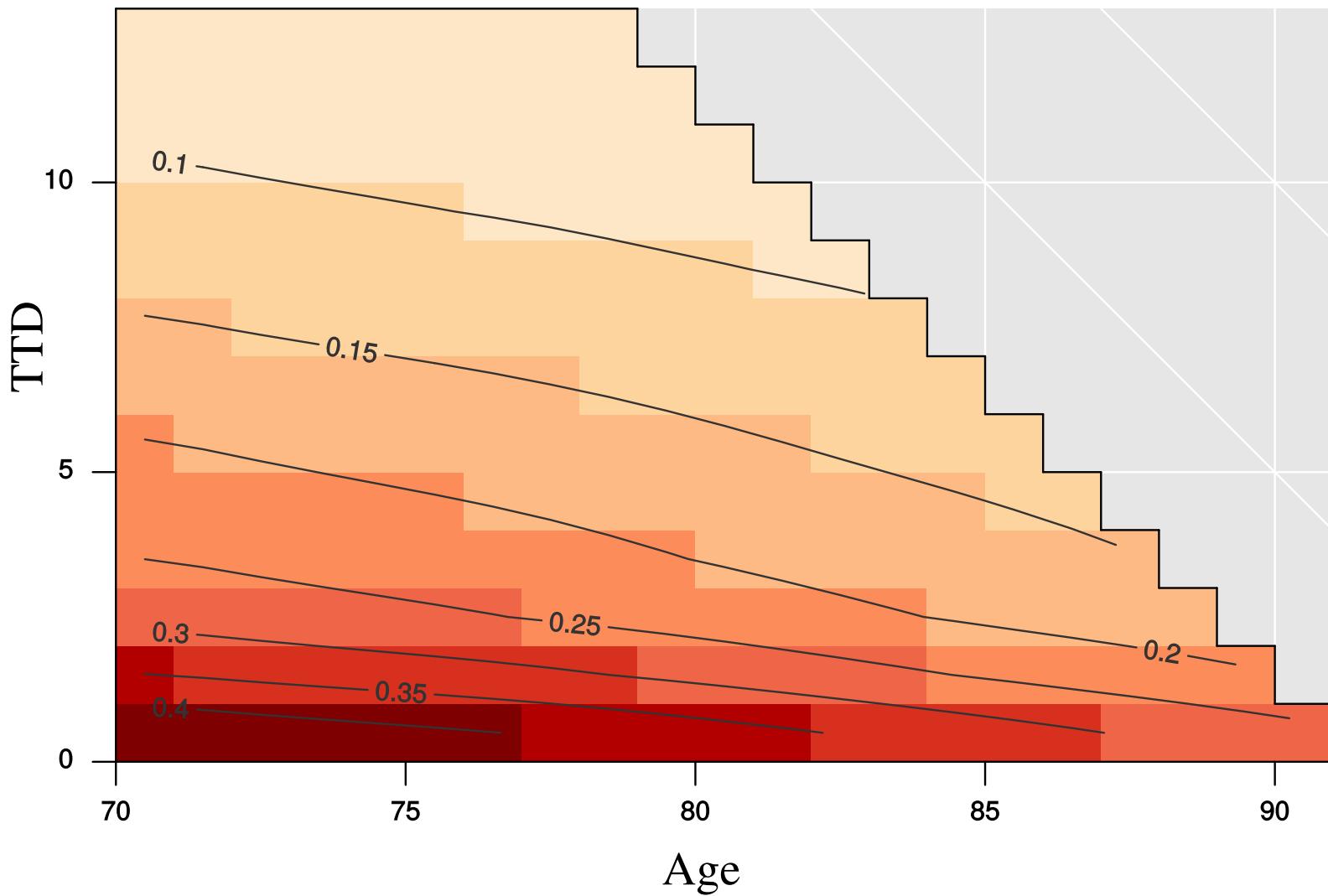
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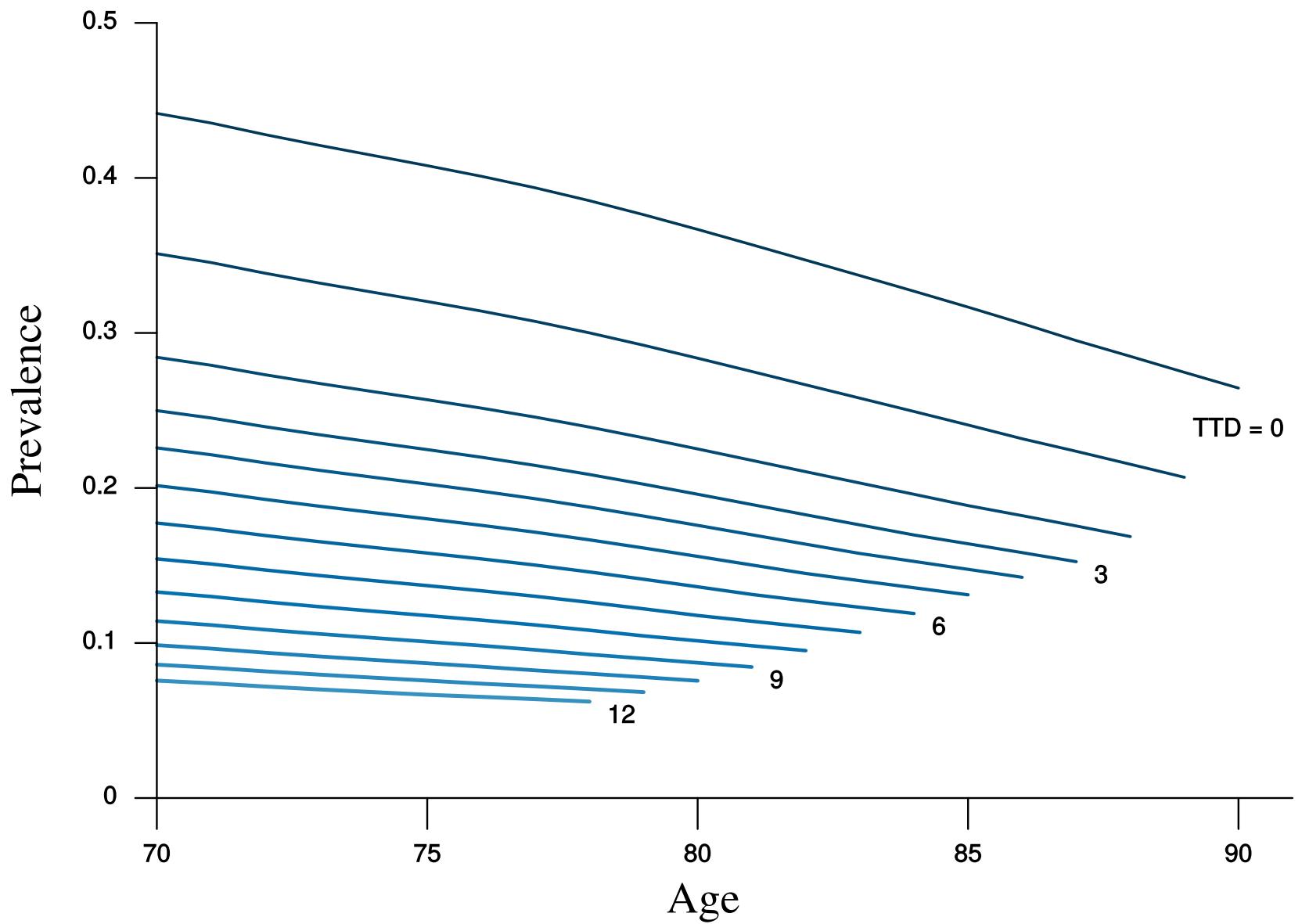


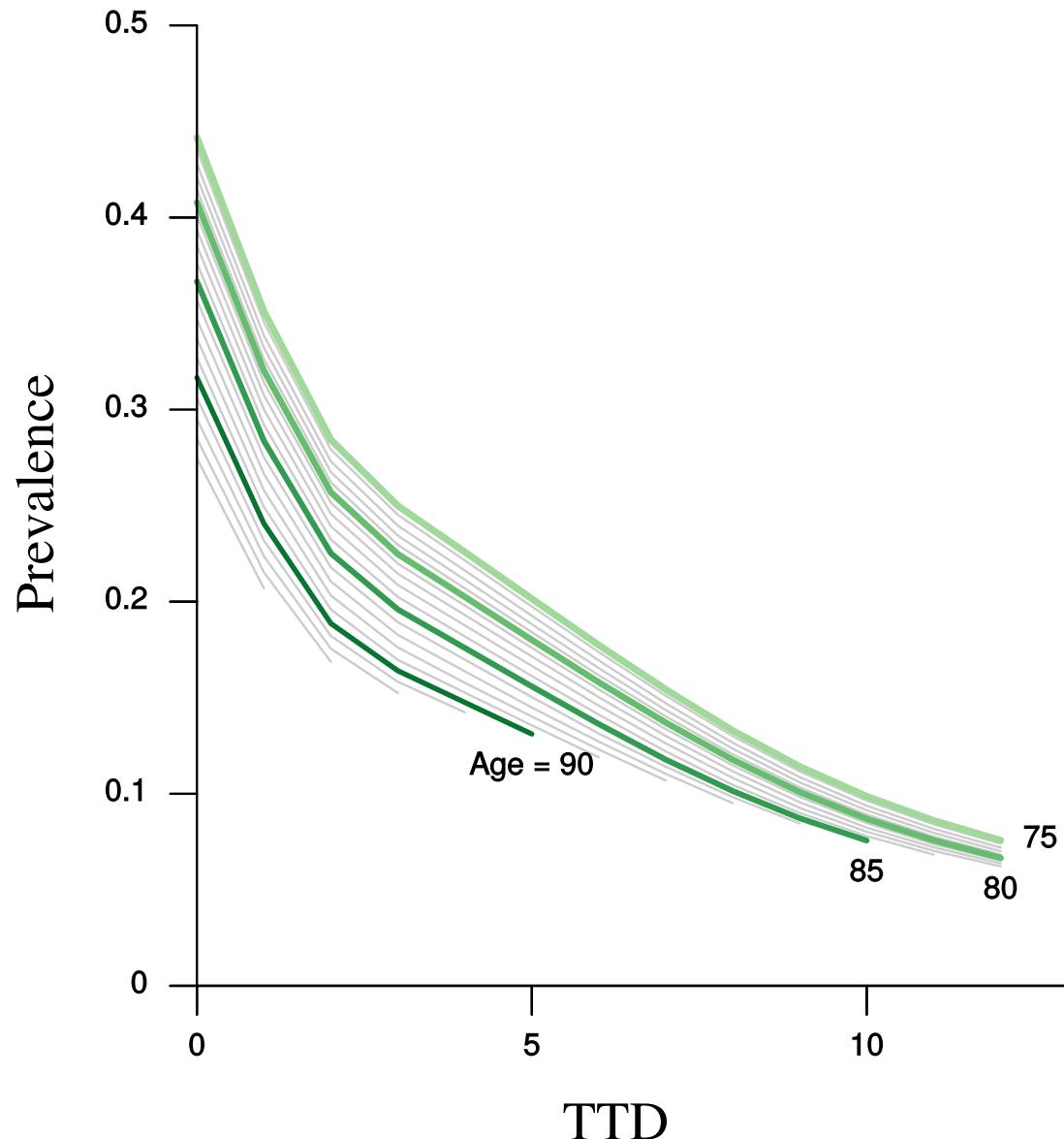


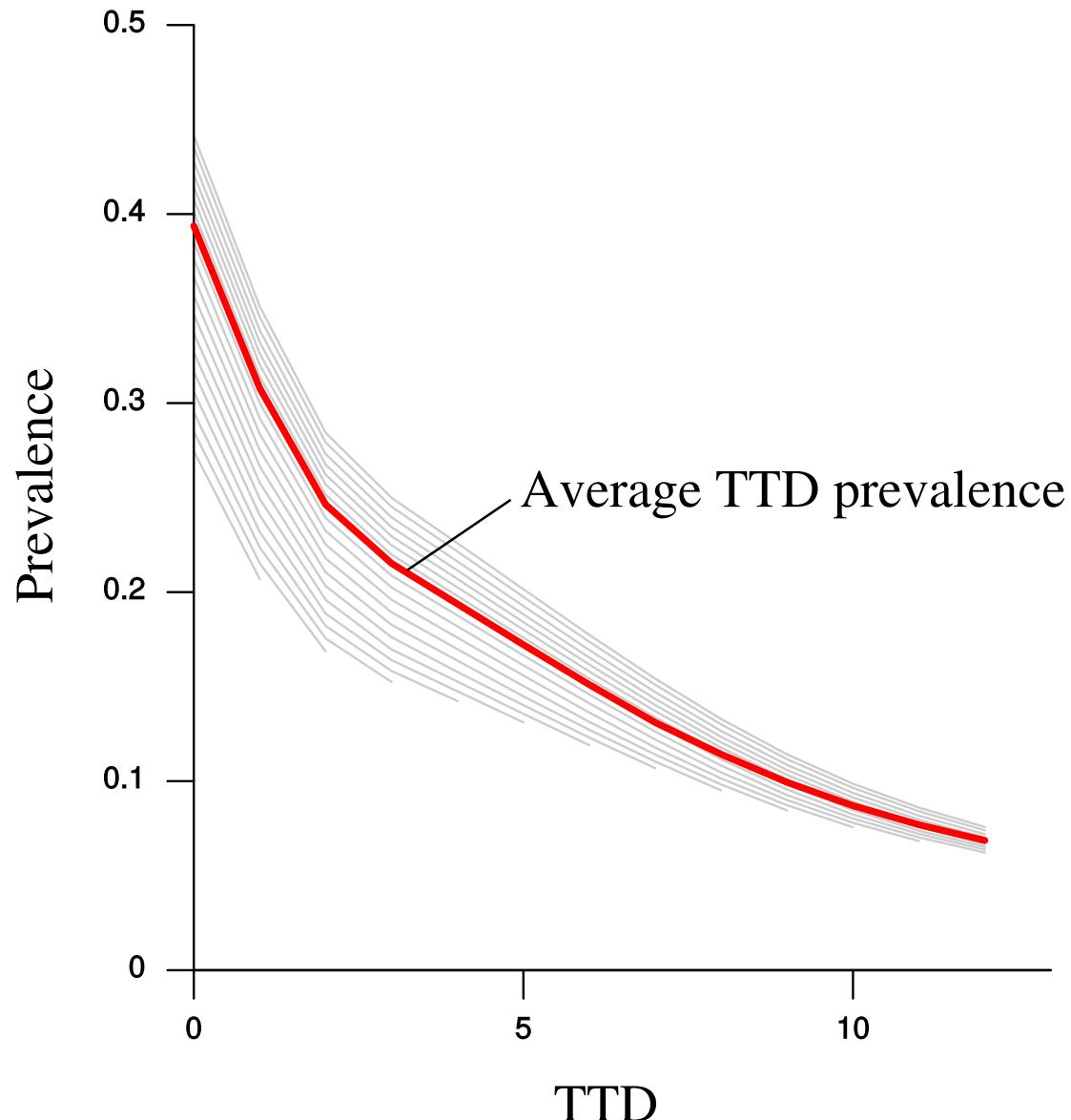
Klijns et al. (2011)

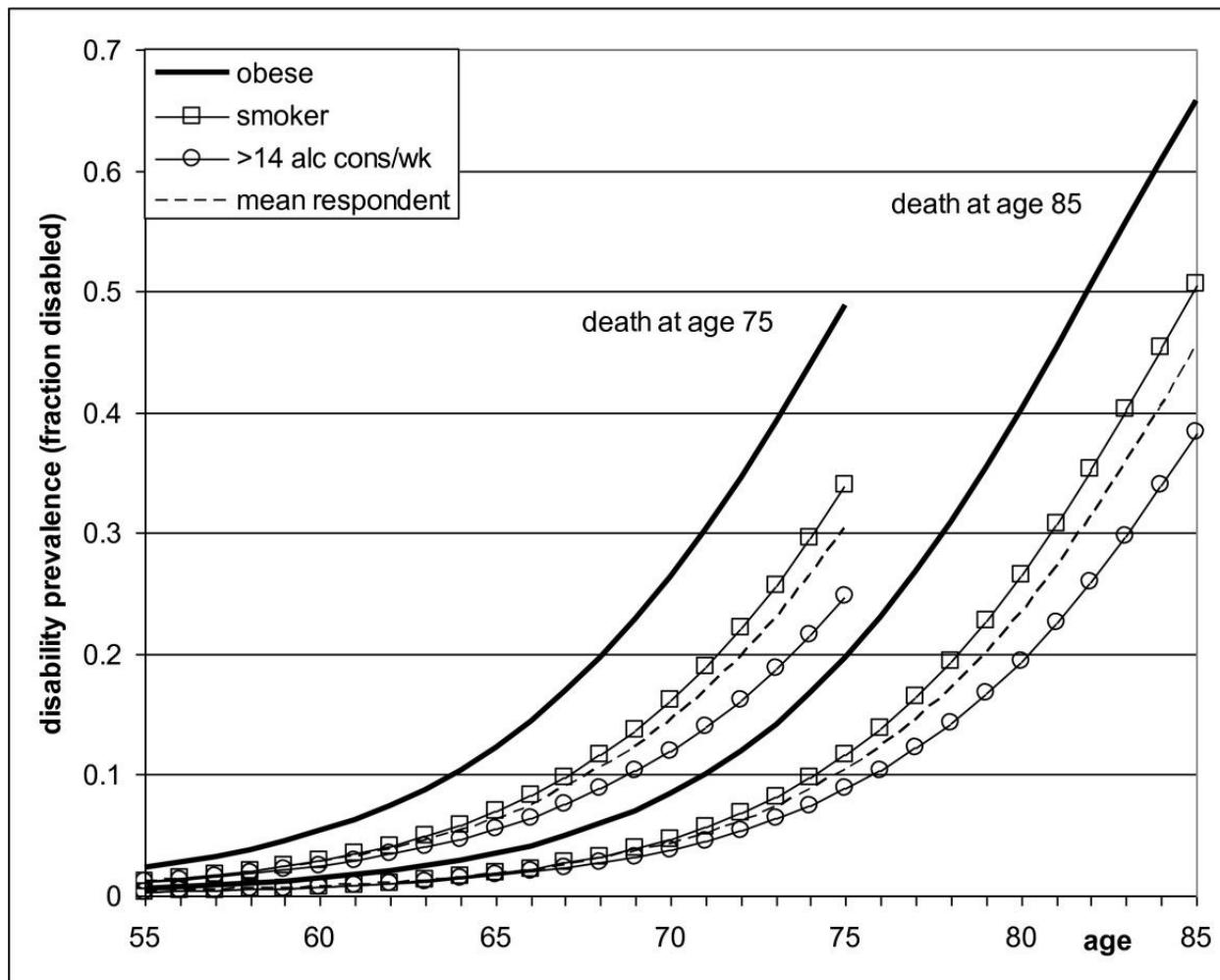


Prevalence of USA females (1915-1919 cohort) self-reporting poor health (HRS)

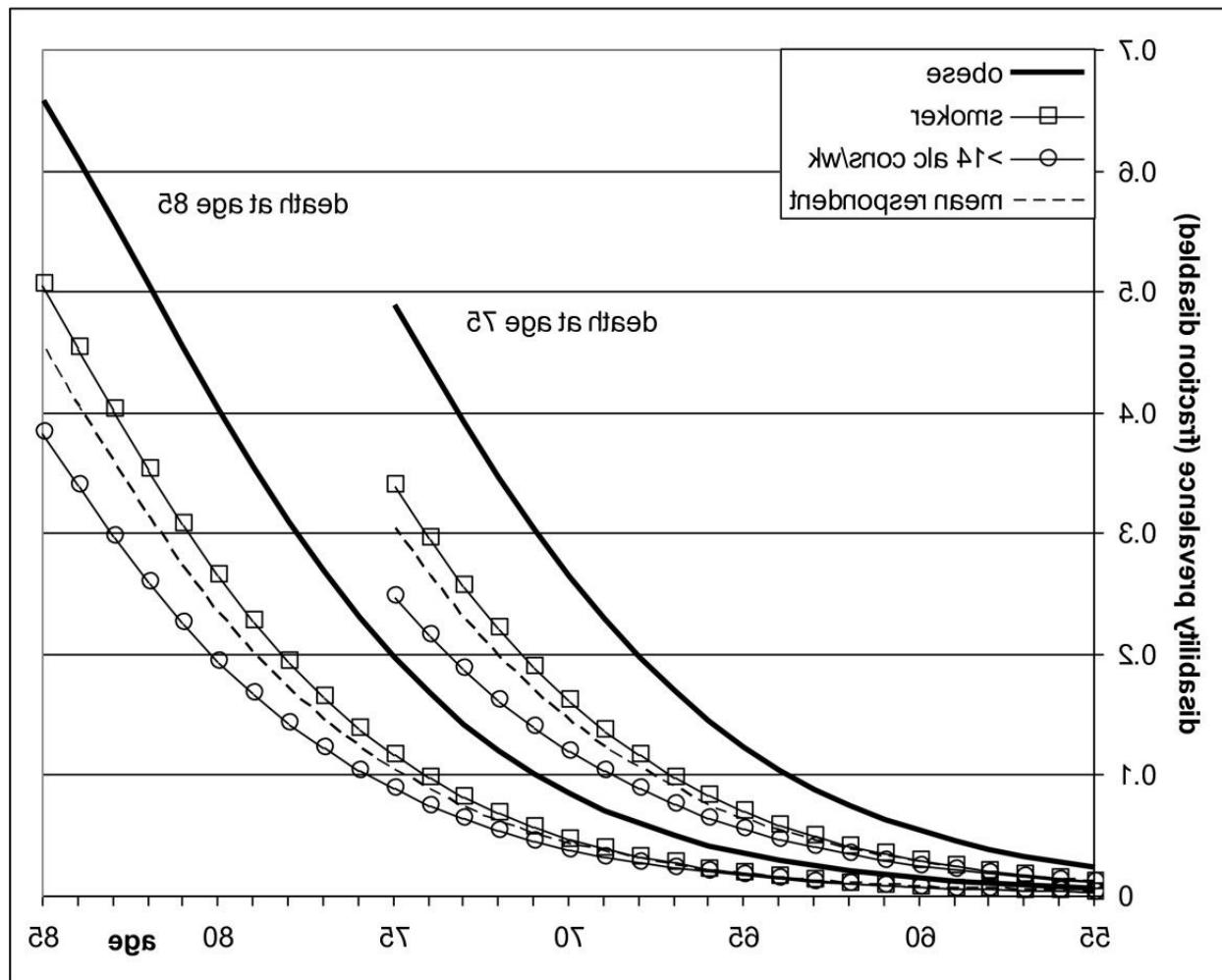






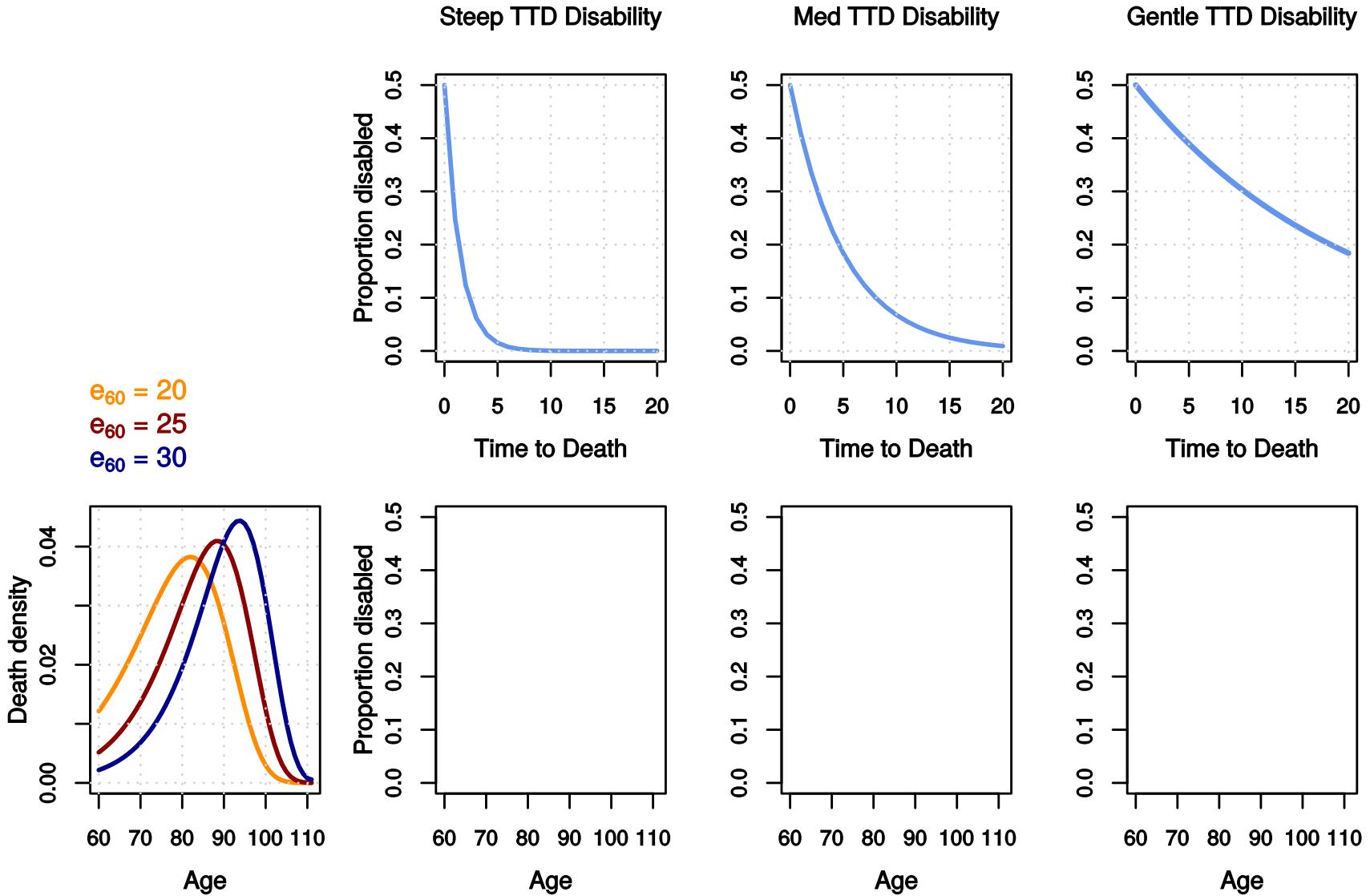


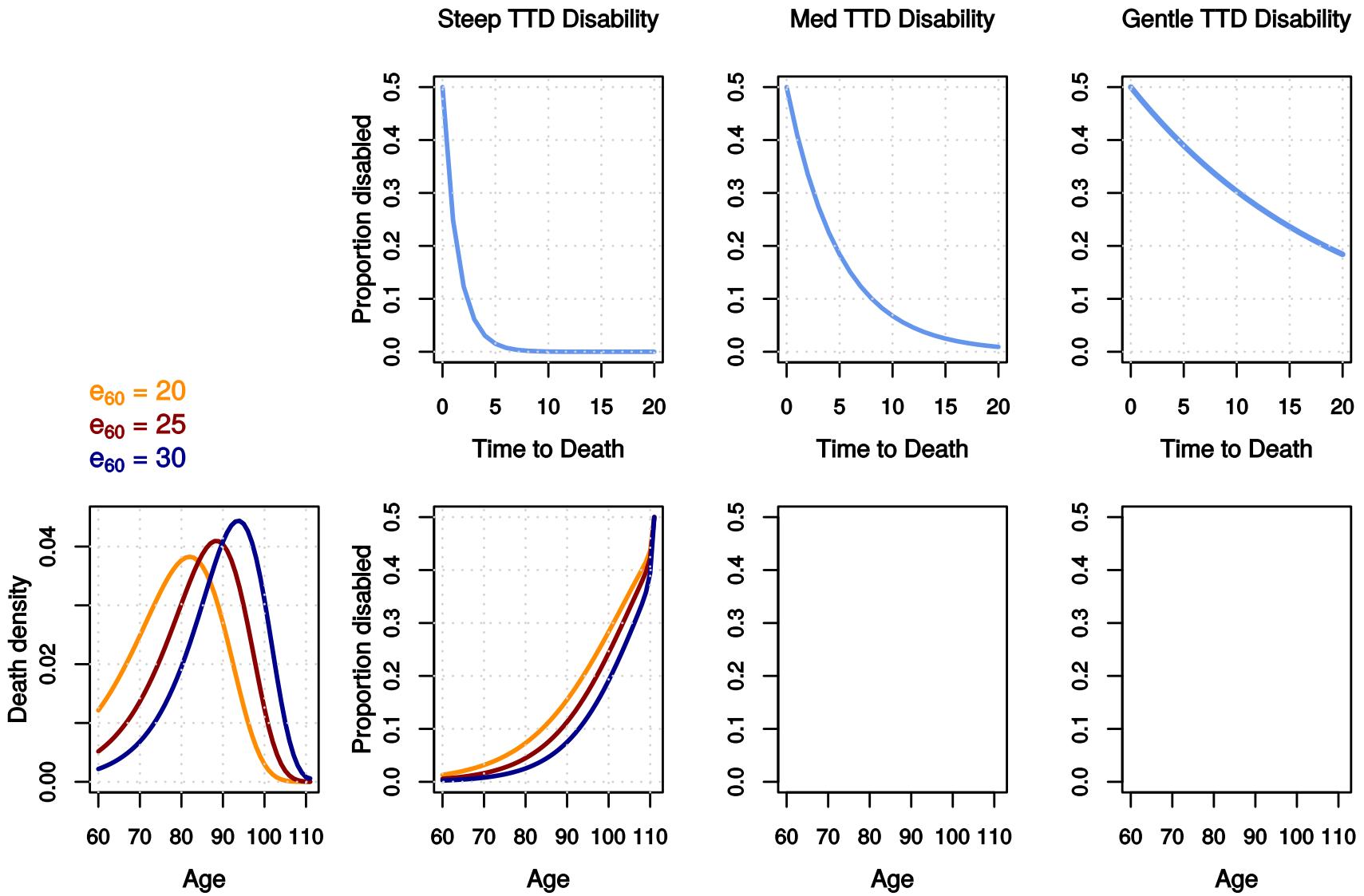
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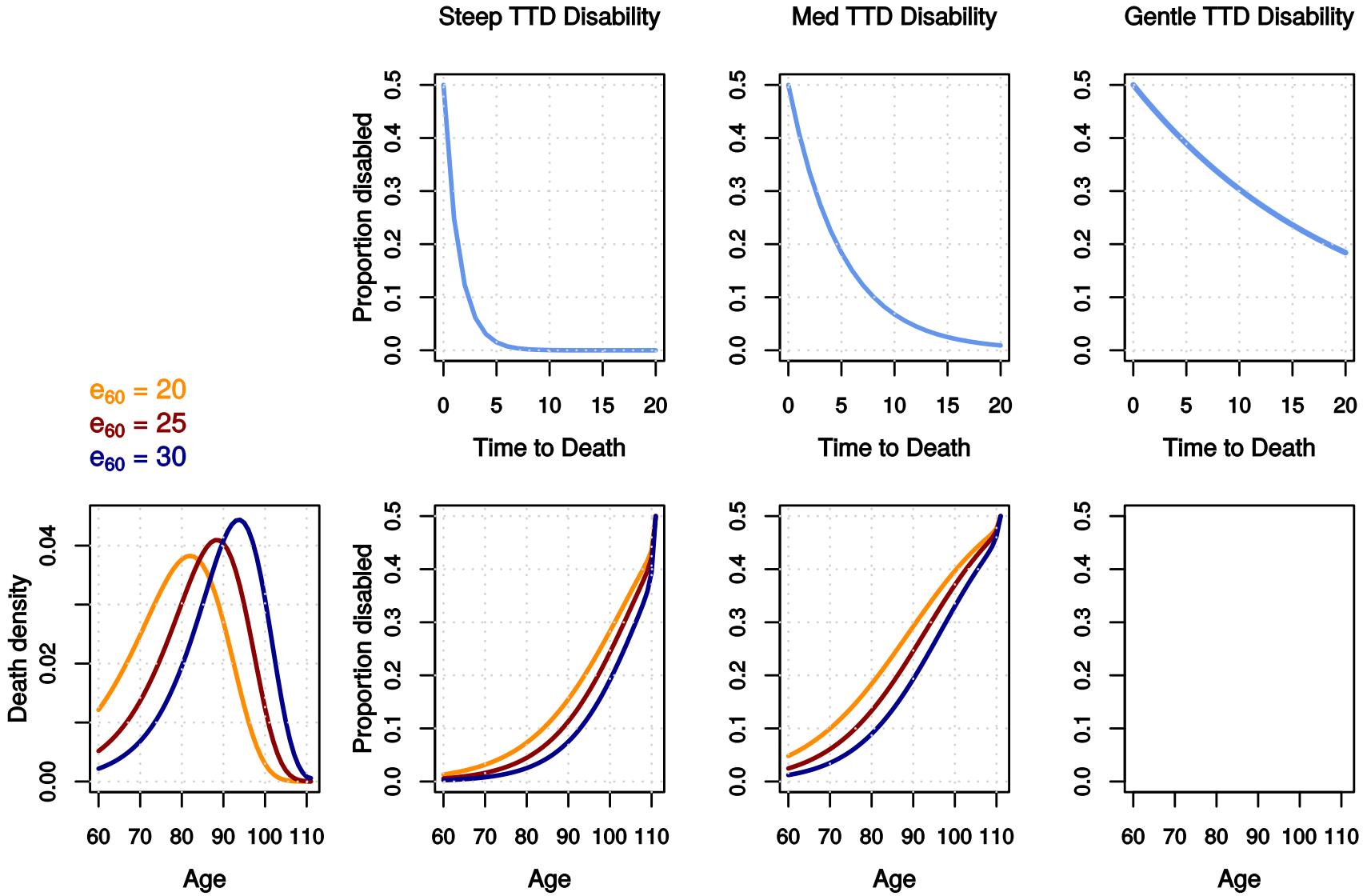


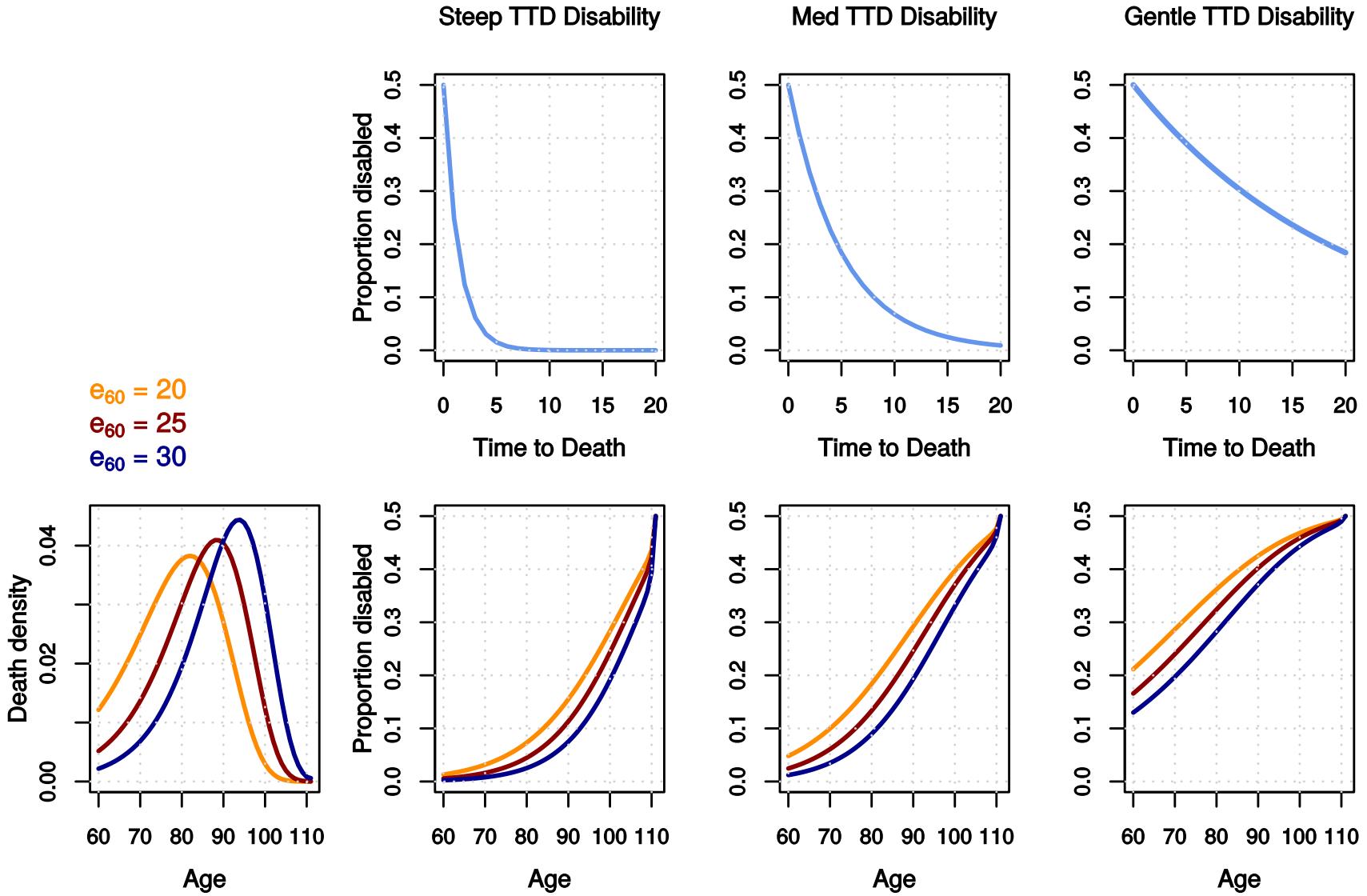
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Held constant, time-to-death prevalence moves *with* longevity.









Are differences in HLE (ULE) due to mortality or morbidity?

Decomposition methods isolate the effects of changes in  
 $\mu_x$  and changes in  $\pi_x$

Considered as *mortality* and *morbidity* effects  
(Andreev et al. 2002, Nusselder and Looman 2004)

Interpretation problem:  $\pi_x$  itself  
can change with longevity

How biased might such decompositions be?

- ▶ Estimate empirical TTD profiles for different disabilities (USA HRS, 1905-1930 cohorts)
- ▶ Convert TTD profiles to  $\pi_x$  using HMD lifetables
- ▶ Assume all populations stationary
- ▶ Decompose pairwise ULE differences between all populations (1980, 1990, 2000) into *mortality* and *morbidity* components
- ▶ Same for within-population changes over 10-year periods, 1950-2010
- ▶ (By design, all ULE differences due 100% to mortality)

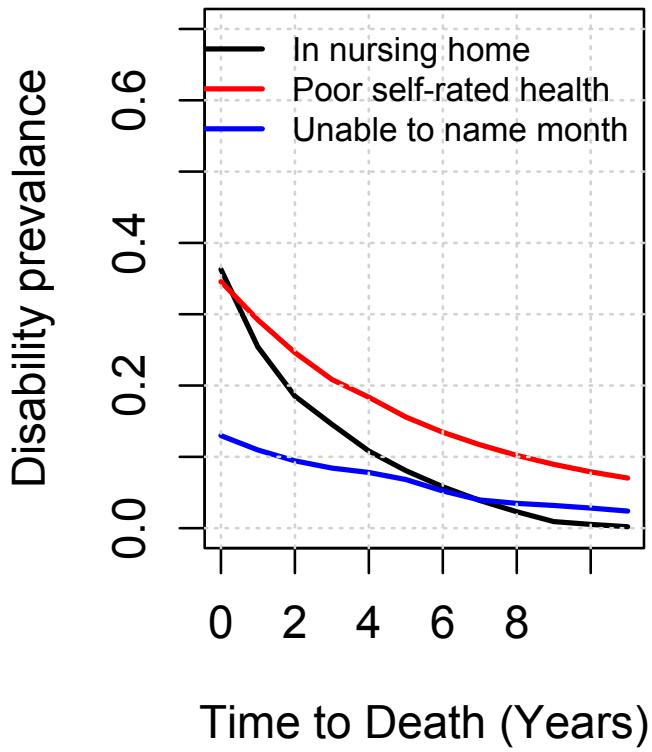
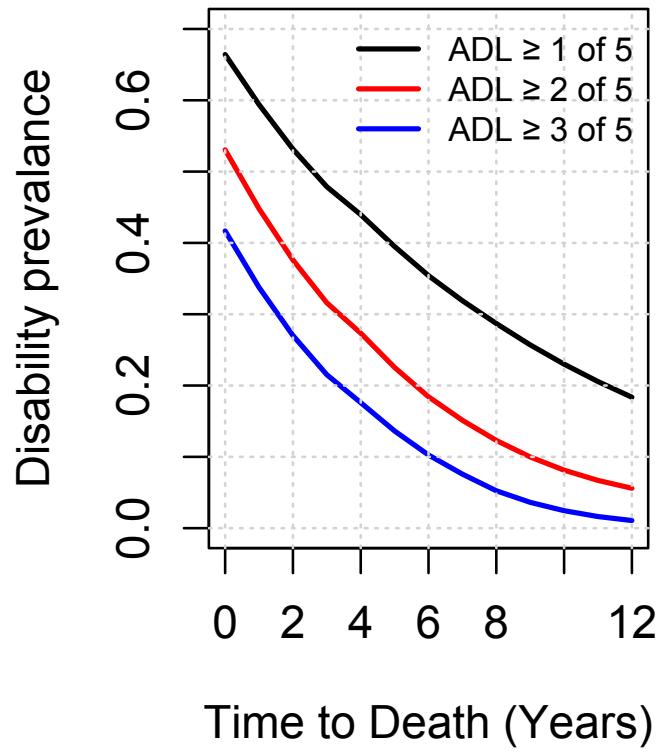
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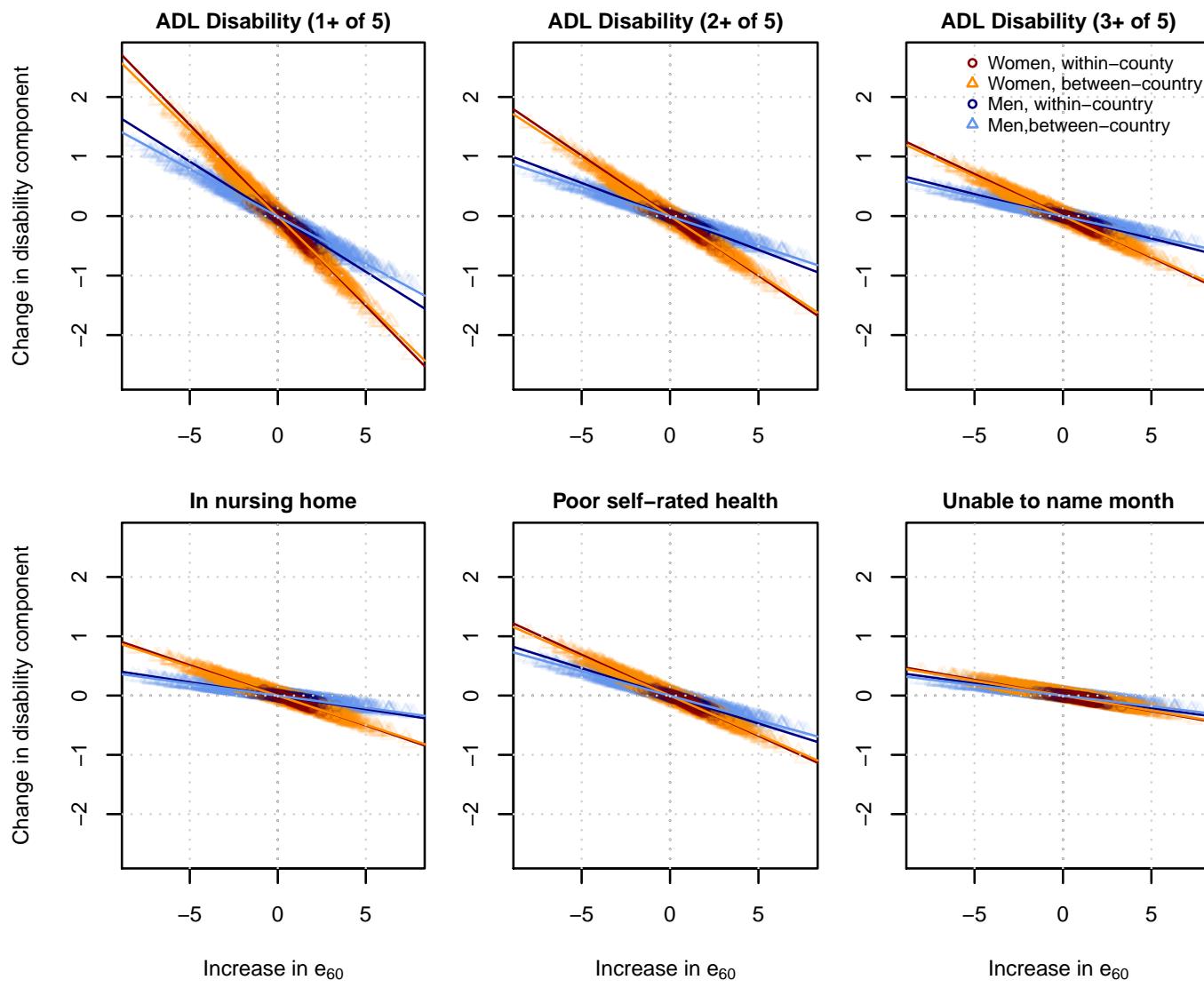
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- ▶ HLE (ULE) important health metrics
- ▶ Difficult to properly interpret period differences
- ▶ Age patterns of disability can change due to mortality, even if TTD prevalence held constant (dynamic equilibria re Klijns et al. 2011)
- ▶ Could partly explain why mortality levels and disability prevalence are related (Van Oyen et al. 2013, Luy and Minagawa 2014)

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Thanks!

