Educational Differences in the Compression of Disability Onset in the United States

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A wealth of evidence documents that more education is associated with better health

- Compared to groups with low levels of education, well-educated groups have:
  - Lower prevalence of most major chronic conditions, impairments, functional problems and disability
  - Lower mortality rates leading to a longer life expectancy
  - Lower disability rates leading to a longer healthy life expectancy
- For the most part, comparisons of health metrics across education groups relies on expected values (e.g., means, expectancies)

Growing interest in how education is associated with the compression of health, particularly mortality

- Conceptually, as education increases, individuals not only have access to more of a particular type of resource that stems from education, but they also have access to *more* types of resources
  - As education increases, groups should become more homogeneous in their health experiences
- Education thus allows the maximization of life/health chances stemming both from *greater levels* and *numbers* of resources

Conceptual Framework

Educational Attainment

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- **Valued information about, and support for, healthy lifestyles, and health care**

- **Access to good jobs and associated rewards in an information-based society**

- **Access to valuable networks/relationships, and perhaps increasingly so with technology advancements and ease of travel**
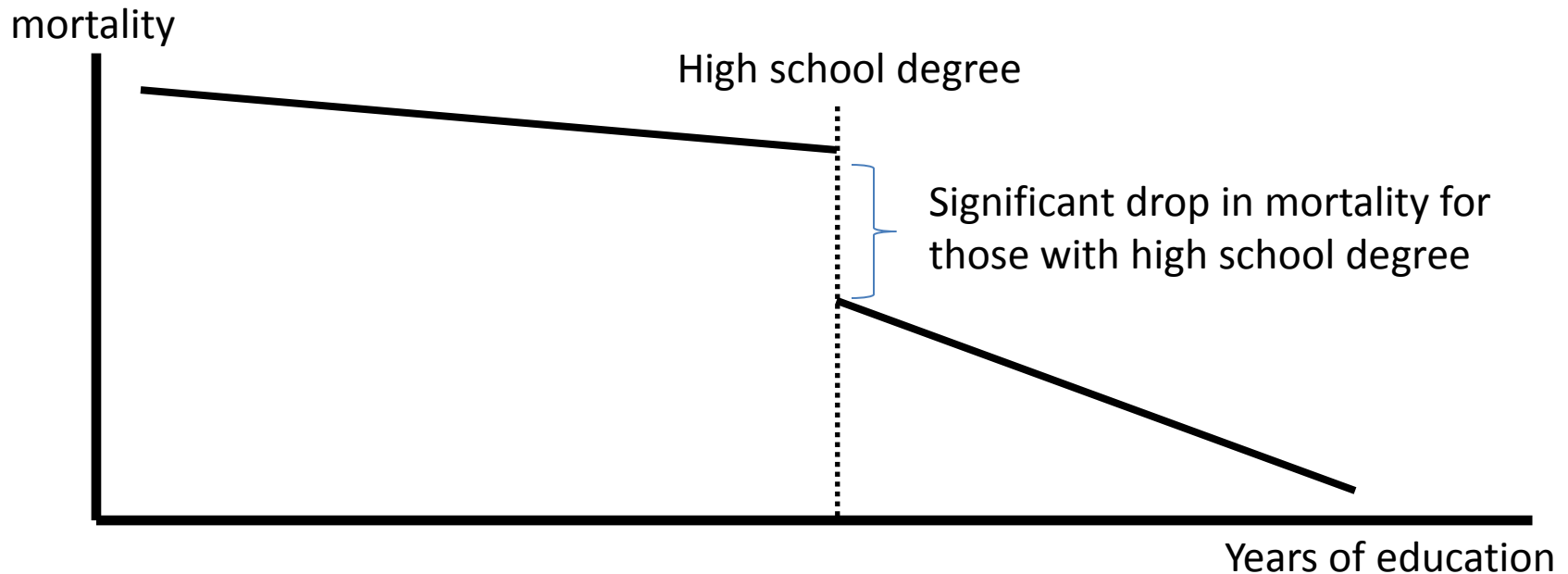
- **Sophisticated cognitive skills, greater sense of control and human agency**

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Active life Expectancy

Different (and more) mechanisms may be operating across the educational distribution

- Education
  - 0-11 years
  - 12 years
  - 13+ years

mortality

High school degree

Significant drop in mortality for those with high school degree

Years of education

Montez et al 2012, Demography

Hypotheses

- At higher levels of education within a population, disability onsets and deaths are redistributed from younger to older ages compared to less educated groups

- As education increases, disability onsets are redistributed faster than deaths such that disability becomes both delayed and compressed

Dataset

- Health and Retirement Study (HRS)
  - A biennial survey beginning in 1992 and that is available up to 2010 (Rand file)
  - The study makes use of seven observation waves (1998-2010) to identify disability onset and mortality for the U.S. population
  - Age 50+

Measures

- Mortality
  - HRS is linked to a National Death Index and also identifies deaths via follow-up interviews (from family members)
- Disability
  - 5 activities of daily living (ADLs: dressing, bathing, eating, bedding and walking)
  - Inactive (Disabled): Have difficulty performing any one of the 5 ADLs
  - Active: Have no difficulty performing all 5 ADLs
- Education (<12, 12, 13 or greater)

Key analytical concepts

- Modal ages in a life table population for
  - death
  - disability onset
- SD(M+) : standard deviation above mode for mortality and disability onset
  - Kannisto 2001; Robine 2001; Cheung et al. 2005

Mortality Compression

Brown et al 2012, Demography

Hypothetical scenario of compression of disability onset

Lower Education

SD_{t1}

SD_{T1}

t1

T1

Higher Education

SD_{t2}

SD_{T2}

t2

T2

Hypothetical scenario of compression of disability onset

Lower Education

SD_{t1}

SD_{T1}

t1

T1

Higher Education

SD_{t2}

SD_{T2}

t2

T2

Longer life

Hypothetical scenario of compression of disability onset

Lower Education

SD_{t1} SD_{T1}

t1 T1

Mortality compression

Higher Education

SD_{t2} SD_{T2}

t2 T2
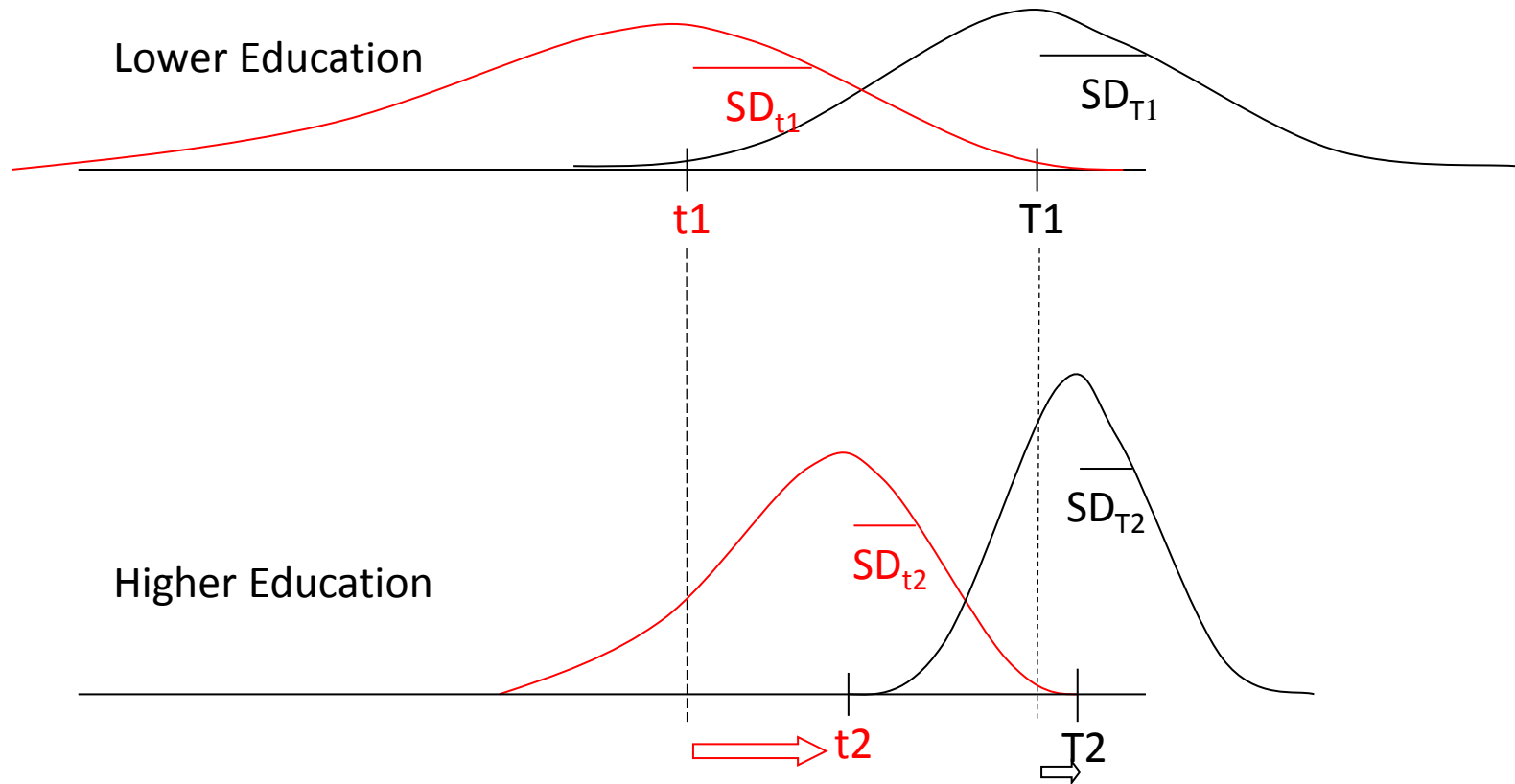
Hypothetical scenario of compression of disability onset
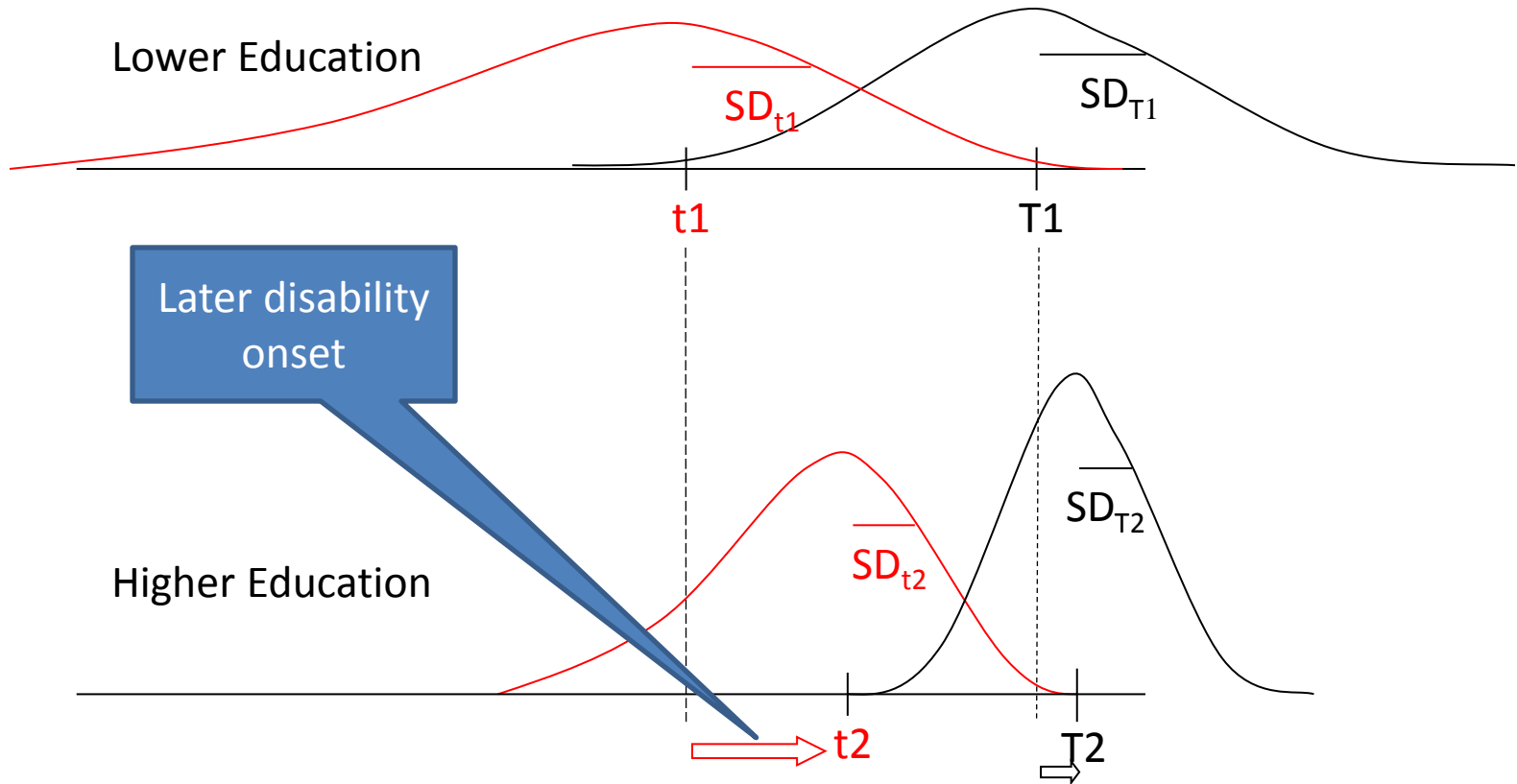
Hypothetical scenario of compression of disability onset
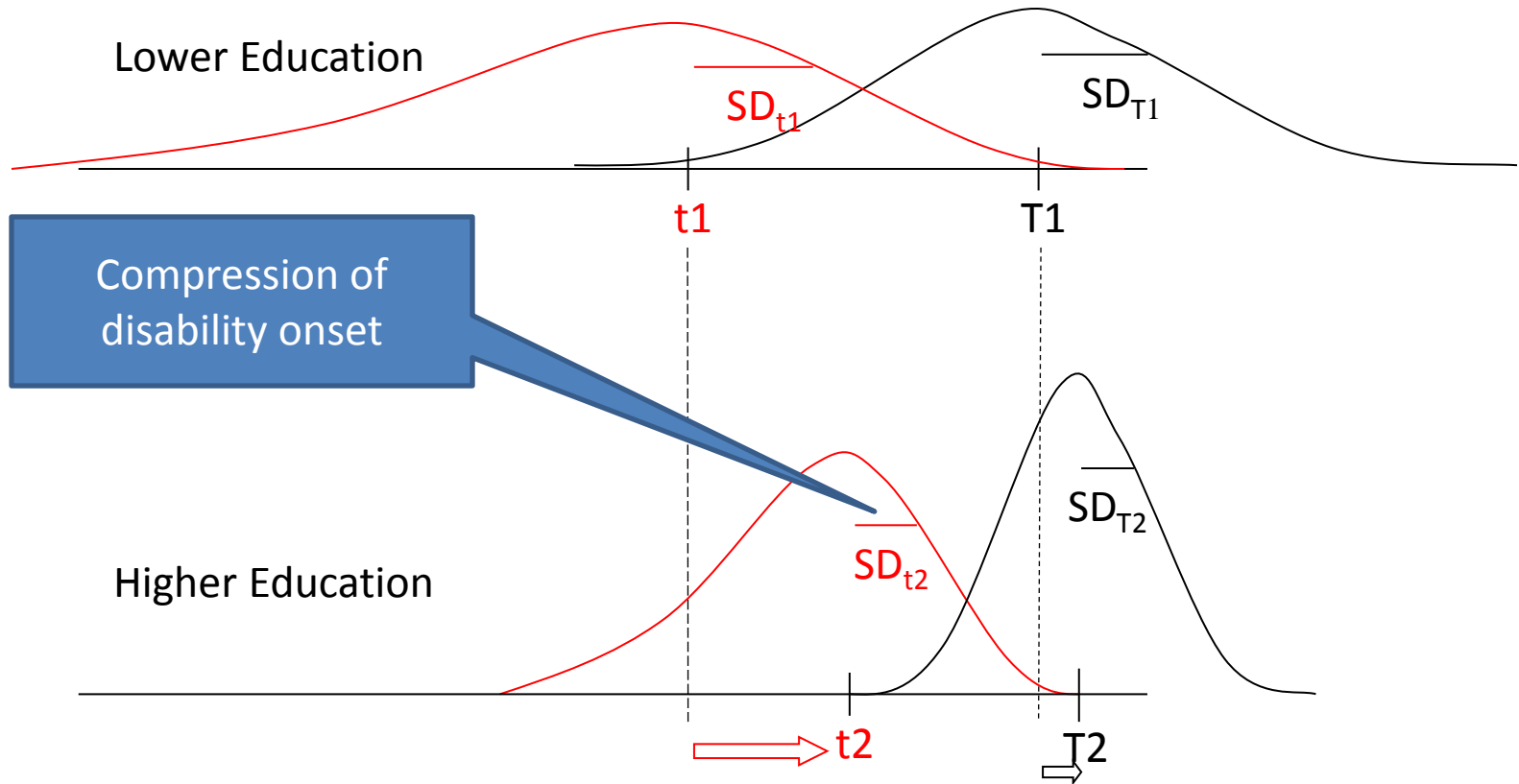
Method

- Transition probability
  - Multinomial logistic regression
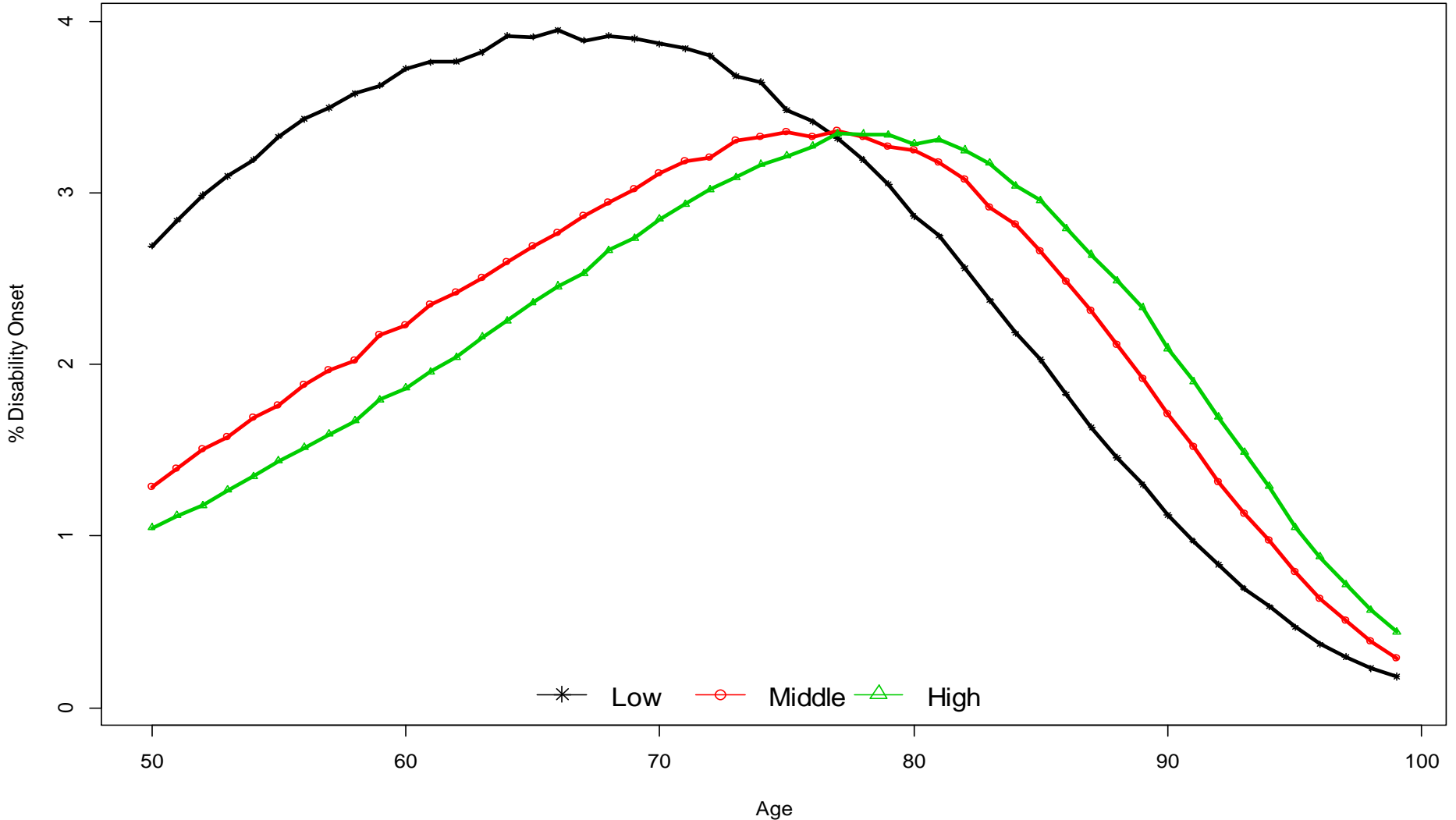 - $\ln(p_{ij}/p_{ii}) = \beta_{0ij} + \beta_{1ij} * Age$, by Sex and Education
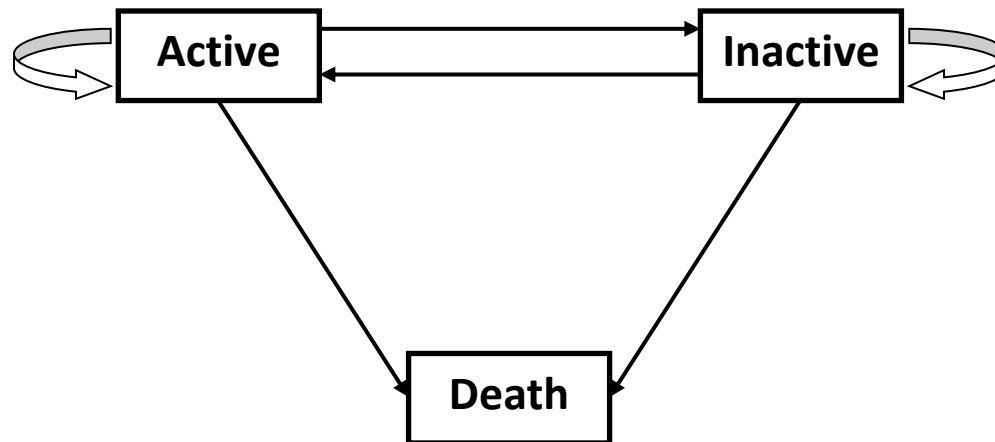
- Microsimulation
  - SPACE program (simulation cohort size = 1,000,000)

Life table deaths by education, women
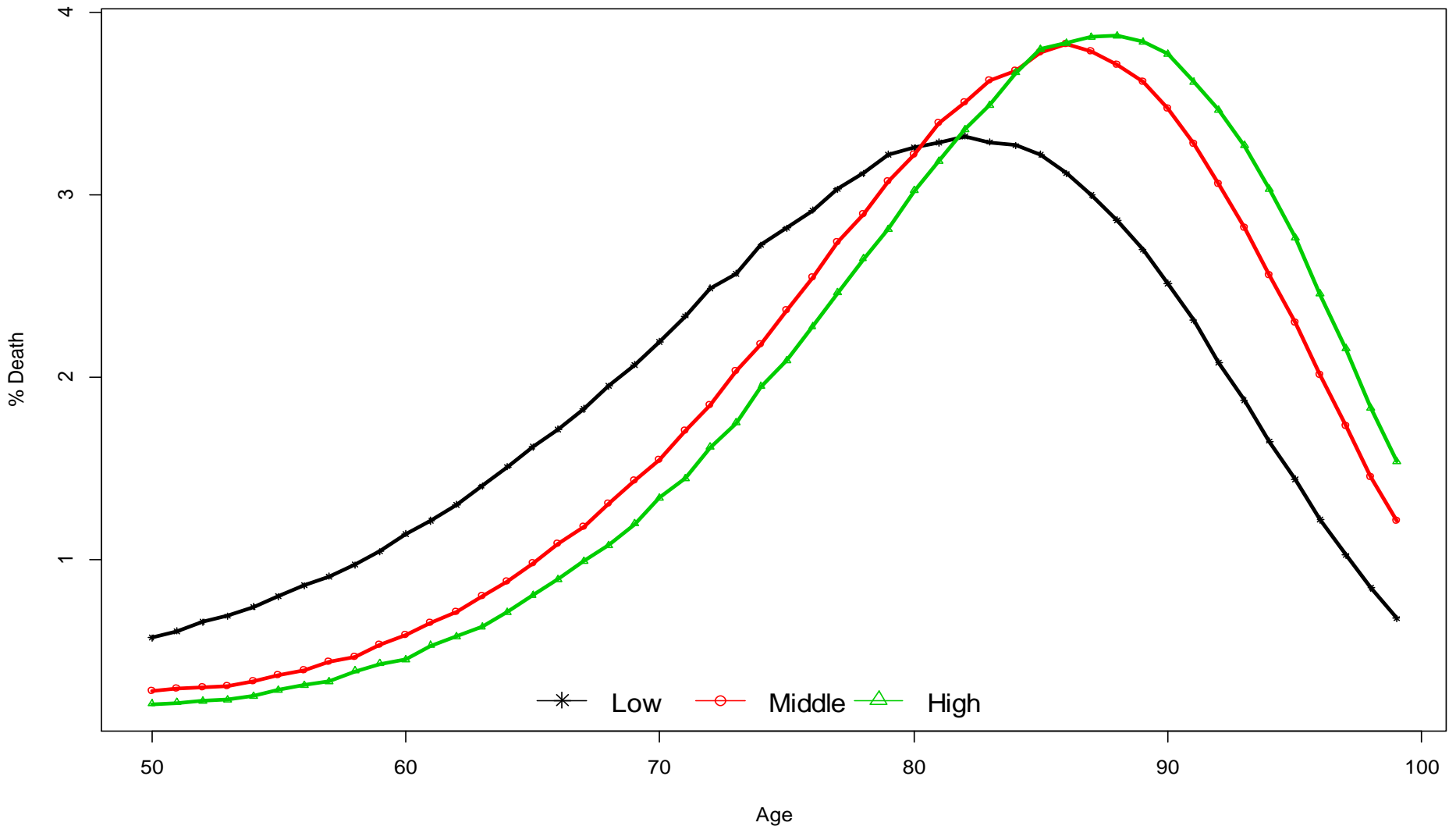
Disability onset by education, women

Compression Results

	Life table deaths			Disability onset		
	0–11 Years	12 Years	13+ Years	0–11 Years	12 Years	13+ Years
Women						
Modal Age	82.53	86.52	88.18	66.39	77.51	77.97
SD(M+)	7.60	6.01	5.45	13.27	9.14	9.25
Men						
Modal Age	78.86	82.70	84.74	61.17	71.14	76.60
SD(M+)	8.39	7.13	6.66	14.42	11.27	9.60

Compression of disability onset and mortality by education group, women
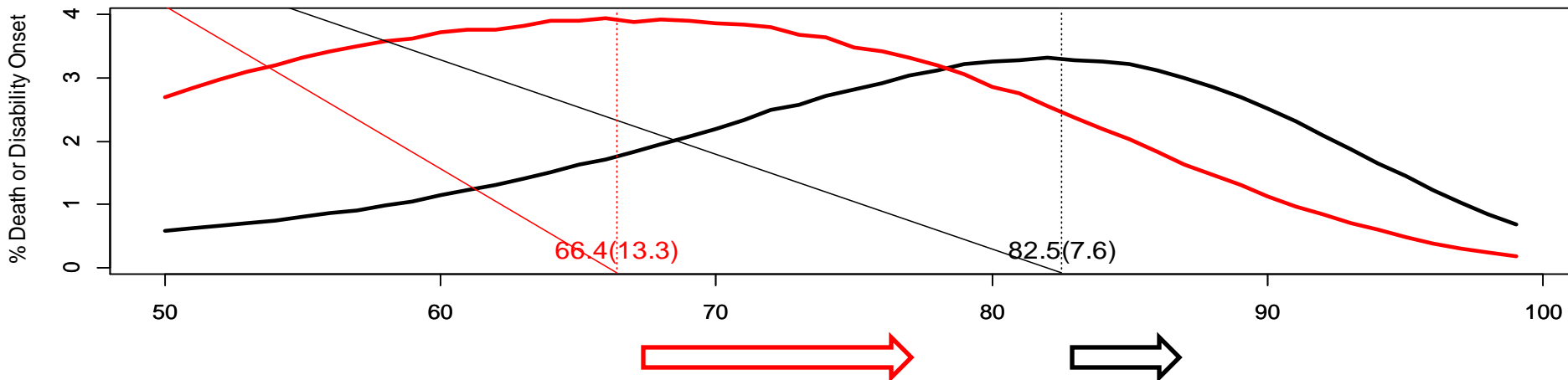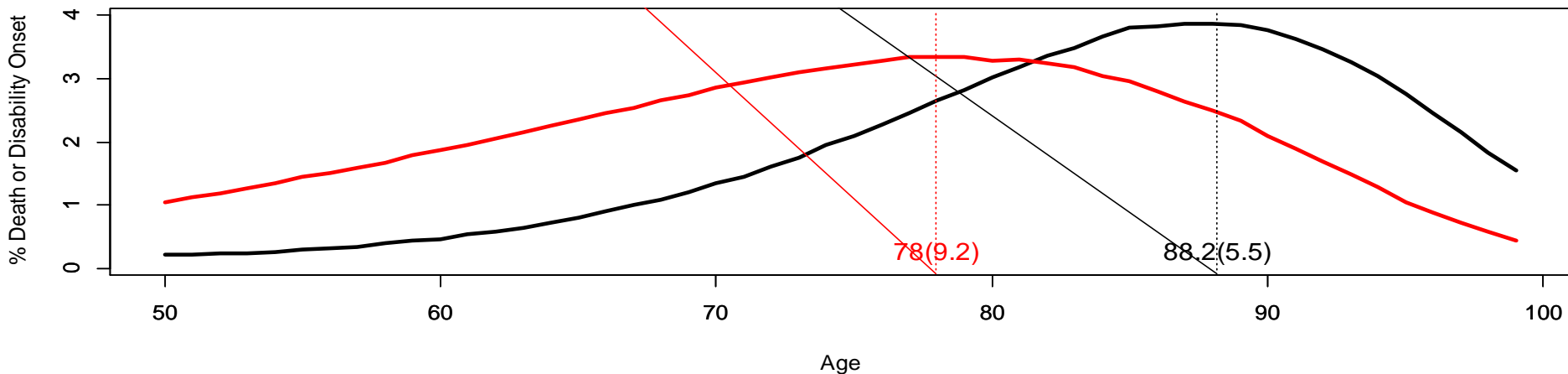
Conclusions

- The study shows that, within a population, the higher levels of education have
  - longer life
  - mortality compression
  - later disability onset
  - disability compression
  - compression of disability onset.

Our Next Steps

- Bootstrap technique
  - To estimate sampling variability
  - To construct confidence intervals
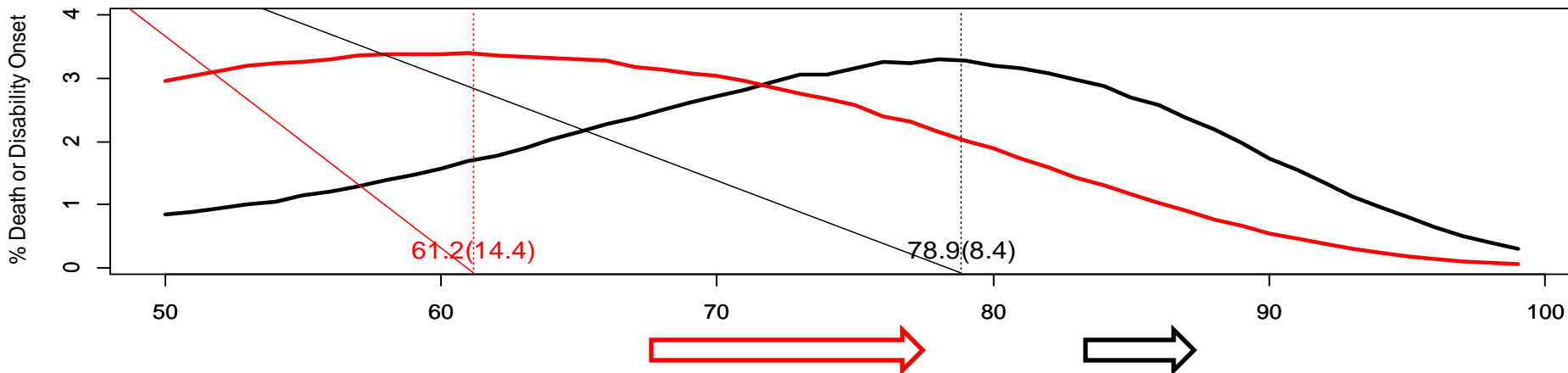 - To perform significance tests
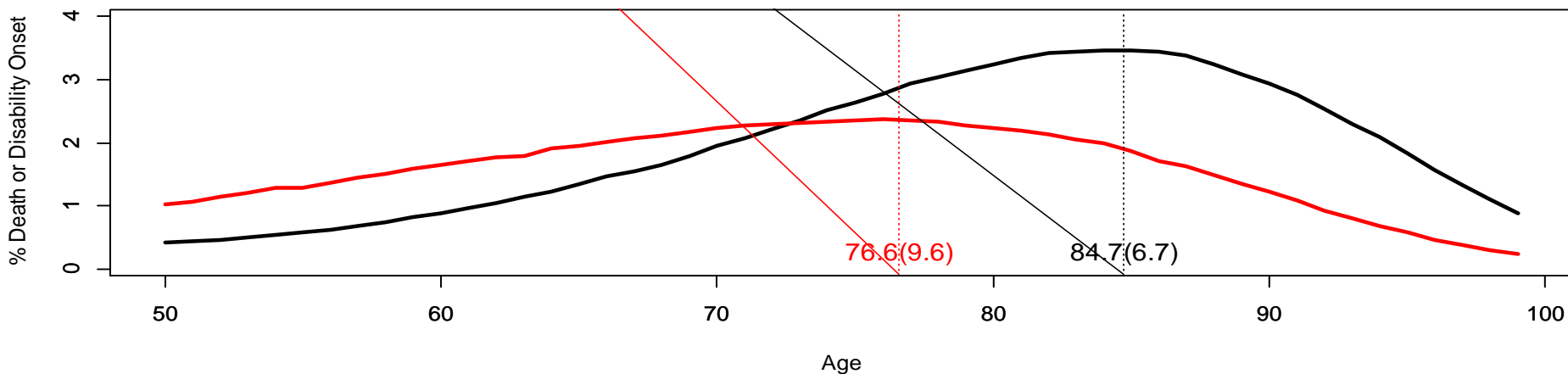
Thank You!

Disability onset by education, men
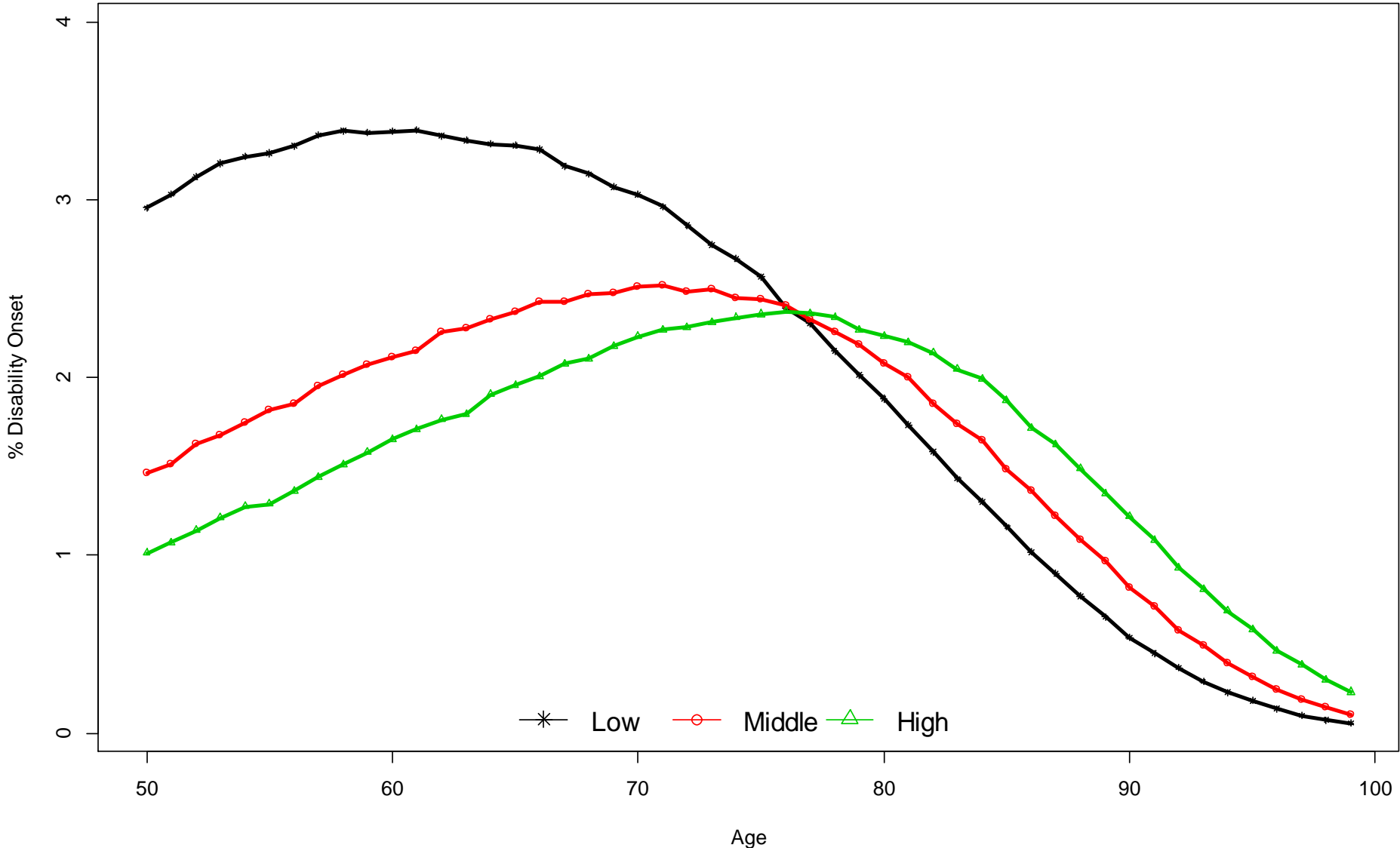
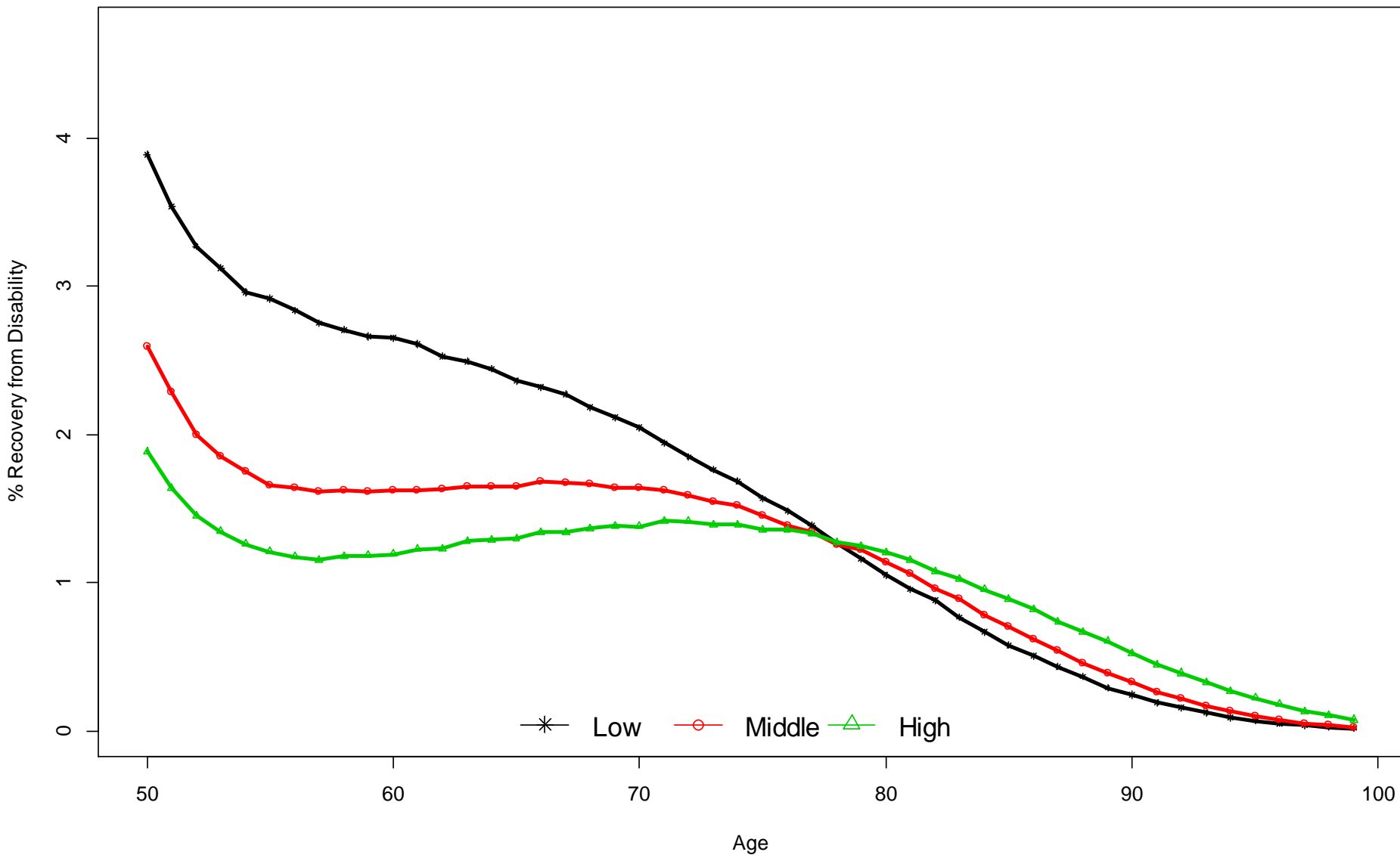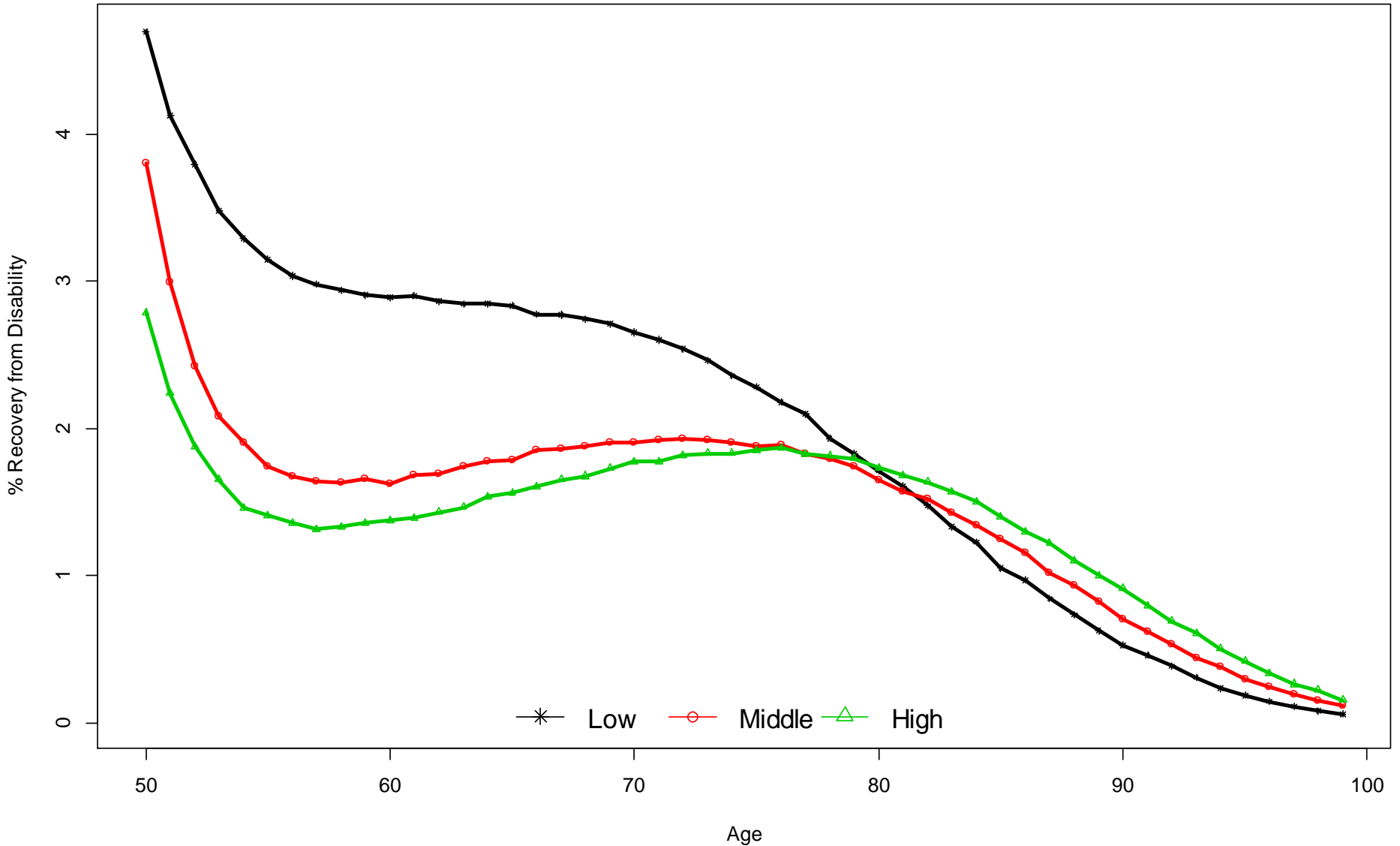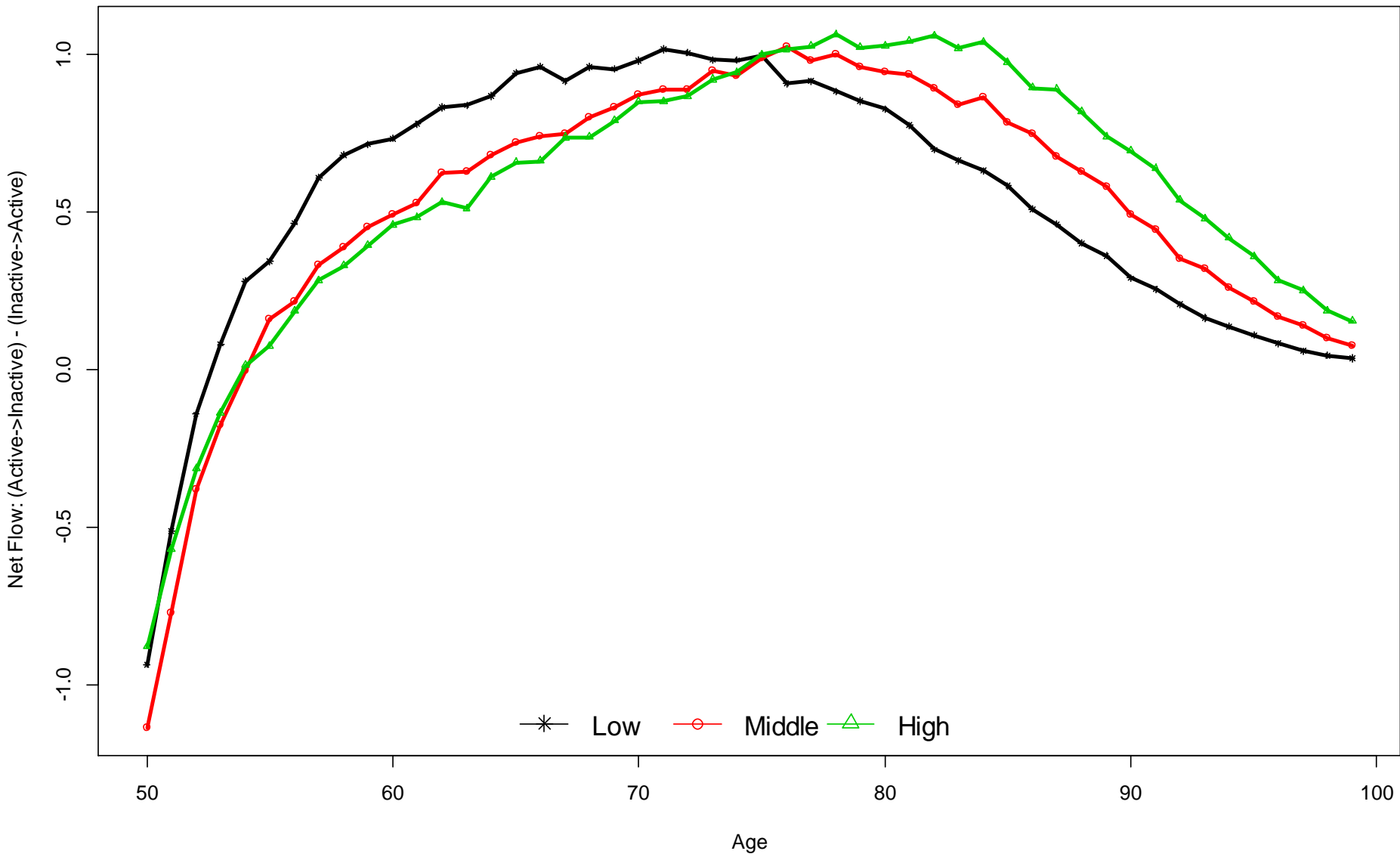# Compression of disability onset and mortality by education group, men

Recovery from disability, men

Recovery from disability, women

Net flow (onset − recovery), men

Net flow (onset – recovery), women