

Competing Causes of Death: Quantifying the Probability of Dying from One Cause Before Another

Marie-Pier Bergeron Boucher, Cosmo Strozza & Elizaveta Ukolova
Interdisciplinary Centre on Population Dynamics, University of Southern Denmark

Interdisciplinary
Centre on Population Dynamics



Background

- Multiple causes of death (MCoD):
 - We die once, but from how many causes?
 - Competing risk or combined risk?

- Causes of death reporting:
 - Impose a competing risk: Only one underlying cause (UC)

- Competing causes:
 - The occurrence of one can prevent the others
 - The reporting of one as underlying prevents the others from being reported

Research questions

- What is the probability that one cause is reported as the underlying cause before/instead of another?
- Is this reporting consistent across countries?
- Is the probability estimated from death certificates representative of the “real” competing risk?

Data

→ Data:

- Danish Causes of Death and Population Registers
- Selected Chronic Diseases and Severe Mental Disorders Register (DK)
- US Multiple Causes of Death Data

→ Deaths grouped into 11 causes

- Infectious and parasitic diseases
- Neoplasms
- Endocrine, nutritional and metabolic diseases
- Mental and behavioral disorders
- Diseases of the nervous system
- Diseases of the circulatory system
- Diseases of the respiratory system
- Diseases of the digestive system
- Diseases of the genitourinary system
- External causes of morbidity and mortality
- Other causes

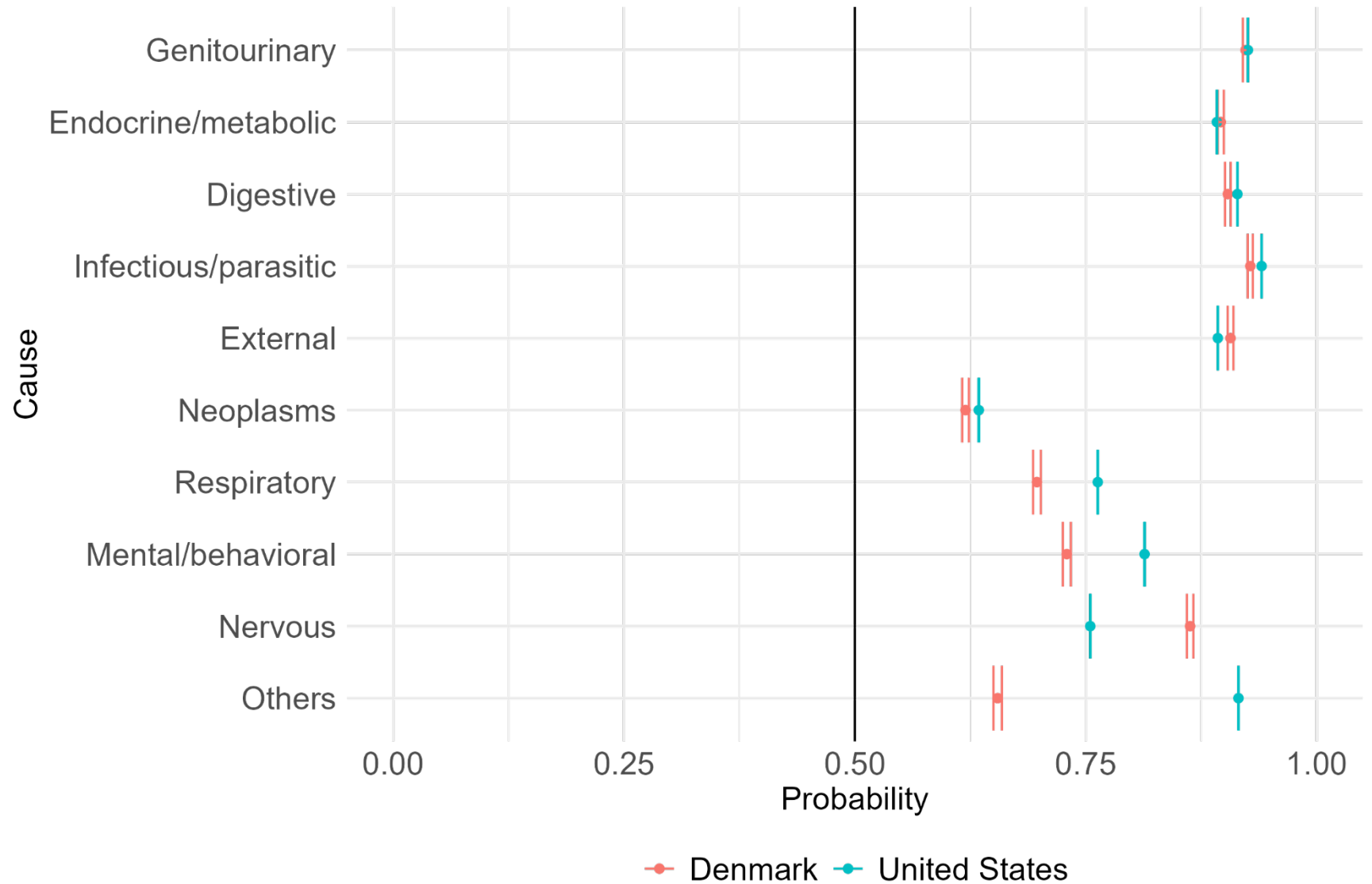
Methods

- Pairwise comparison:
 - Each cause are compared against all the others

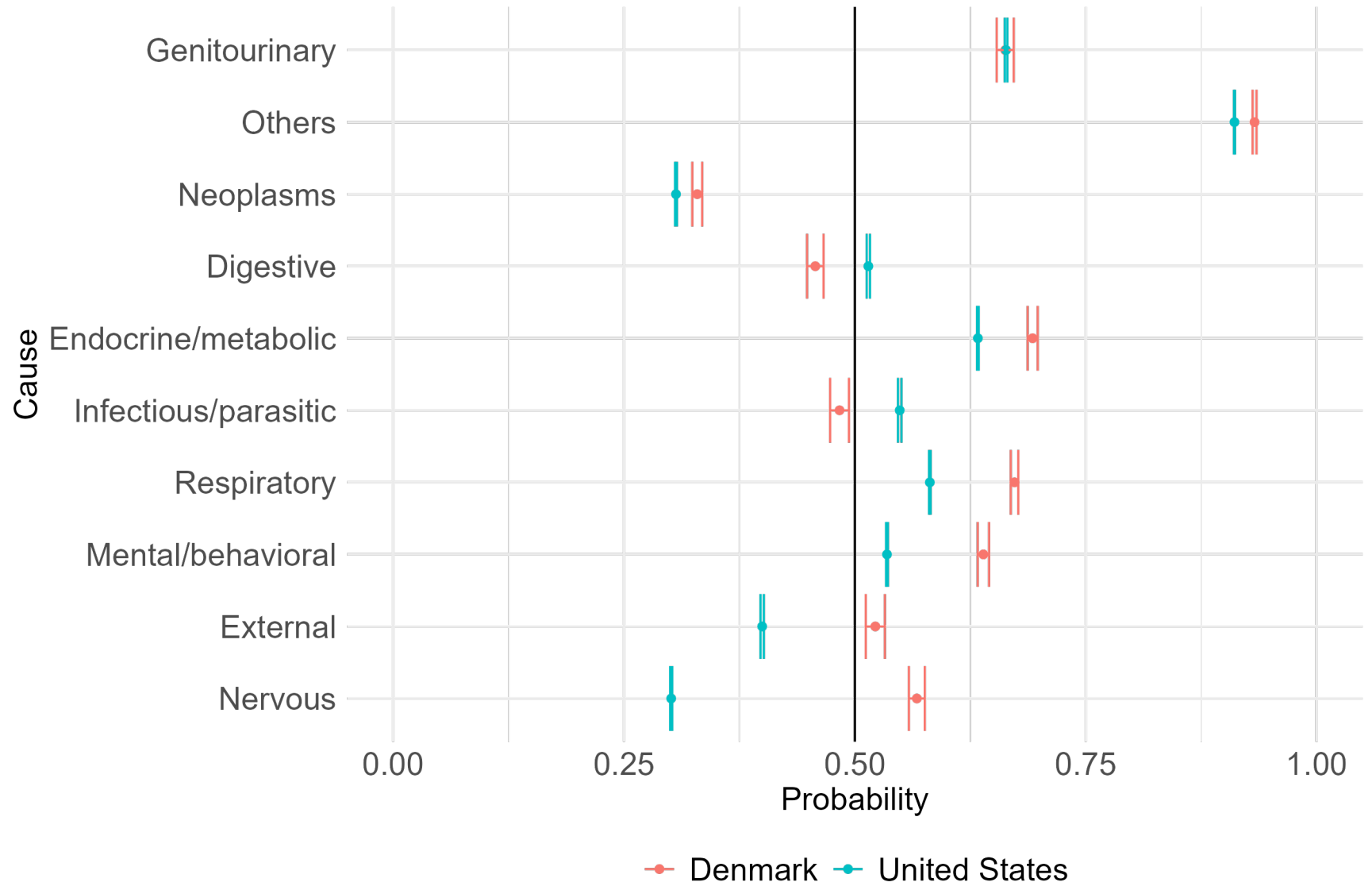
- Probability of dying of cause A before B:
 - Outsurvival statistics – Independent causes (not shown)
 - Cumulative Incidence Function/Multiple Decrement Life Tables – Dependent causes

- Underlying causes (UC) or Multiple causes of death (MCoD):
 - Probability estimated from the mortality risks from the underlying cause only
 - Probability estimated from the mortality risks when both diseases compared are reported on the death certificate

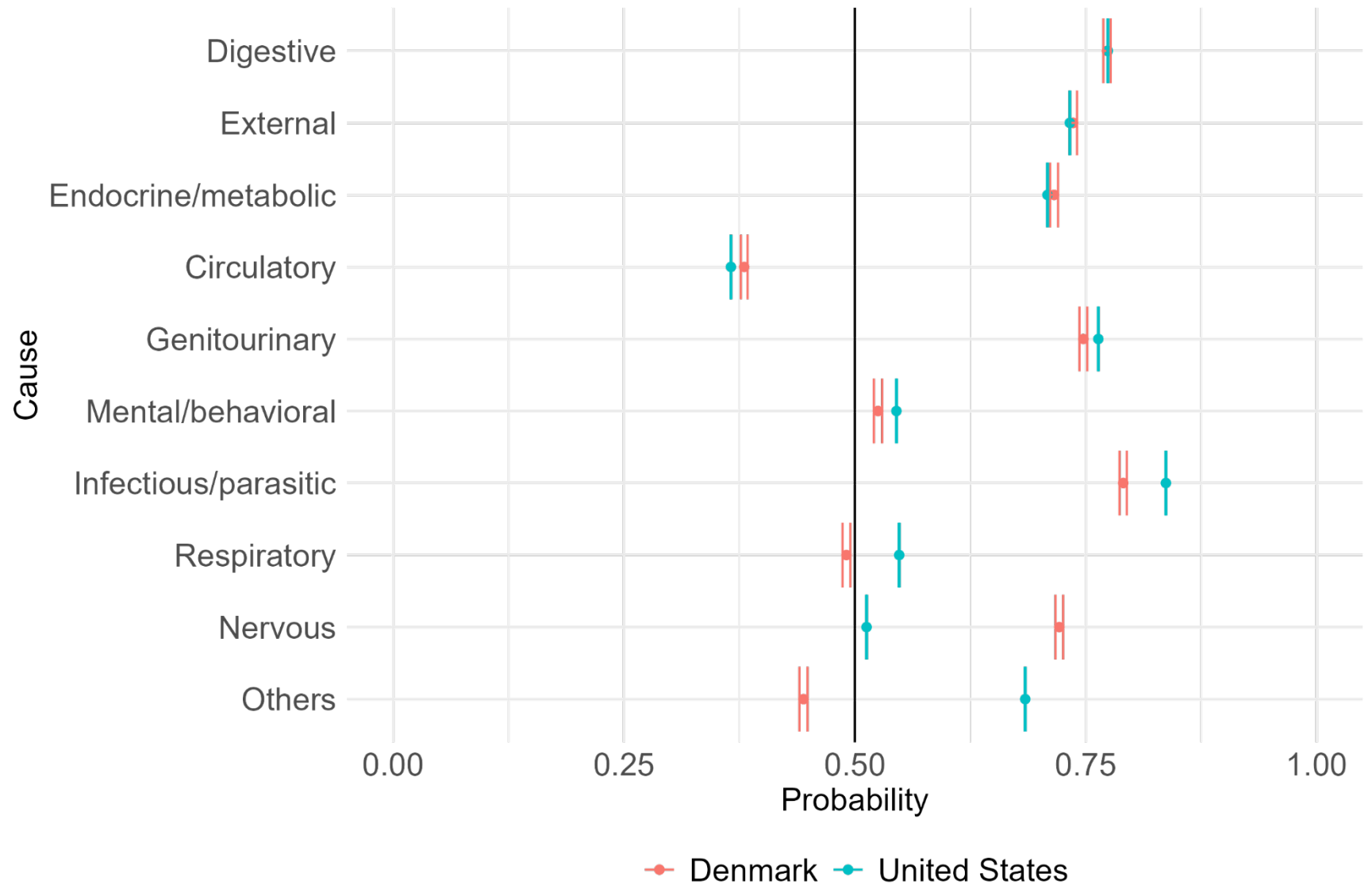
Diseases of the circulatory system - UC



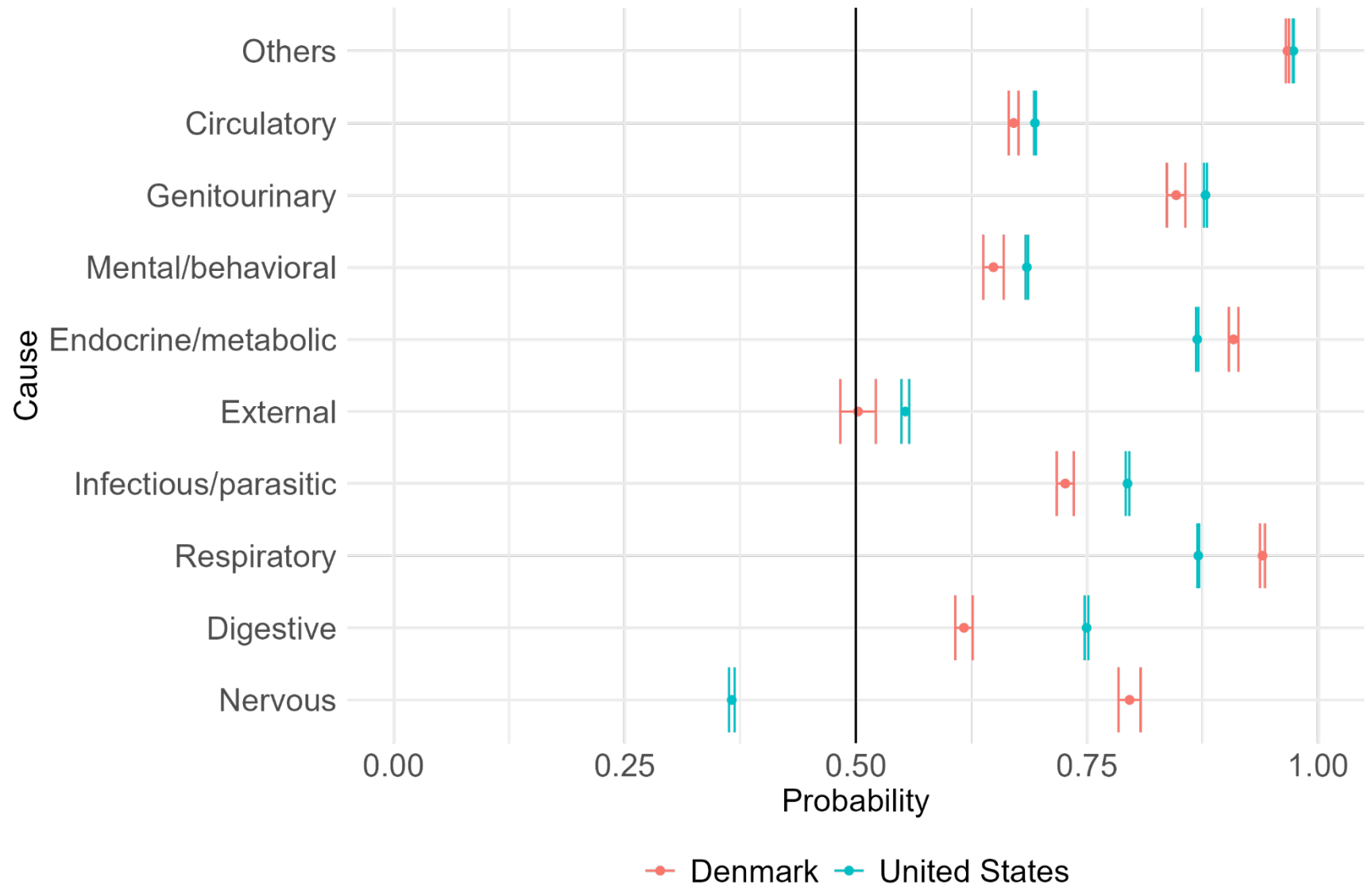
Diseases of the circulatory system - MCoD



Cancer-UC



Cancer-MCoD



MCoD vs “real” competing risk

	Dementia before COPD	Dementia before Diabetes
MCoD	37.7 [33.5,41.9]	73.1 [67.6,78.5]
“Real”	22.7 [21.1 24.4]	88.0 [86.0, 90.0]

Discussion

- Some diseases have a higher chance of being the UC
- Consistencies across countries are found, with notable exceptions
- Probability changes when both diseases compared are reported

- Pairwise comparison - Oversimplification
- Data quality

- Next steps:
 - Confidence intervals
 - More countries?
 - More diseases to be included in the "real" risk analysis

Thank you!
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mpbergeron@sdu.dk

