English Longitudinal Study of Ageing

Demographic and socioeconomic risk factors for pain progression and recurrence

Dr Mikaela Bloomberg

Health Studies User Conference 2025

Background

Demographic and socioeconomic factors such as being female and lower SEP well-established as risk factors for pain onset

Many long-term pain conditions are dynamic characterised by recurring pain and/or pain that worsens and improves in severity over time

Much of evidence base does not allow for these recurring changes in pain

Evidence for demographic and socioeconomic associations with pain worsening and recurrence very mixed[1-7]

Objective: Identify demographic and socioeconomic characteristics of individuals at risk of pain worsening and recurrence

1) Picavet et al. 2019; 2) Milani et al. 2022; 3) Green et al. 2018; 4) Bot et al. 2005; 5) Aili et al. 2021; 6) Neupane et al. 2020; 7) Neupane et al. 2018

Data source

English Longitudinal Study of Ageing

Ongoing study of adults aged 50+ years living in England aimed at investigating health and experiences of ageing

Data currently available from 10 interviews occurring approximately biennially from 2002/03-2021/23

22,000+ core participants and partners

At each wave participants are asked to report whether they experience pain and pain severity

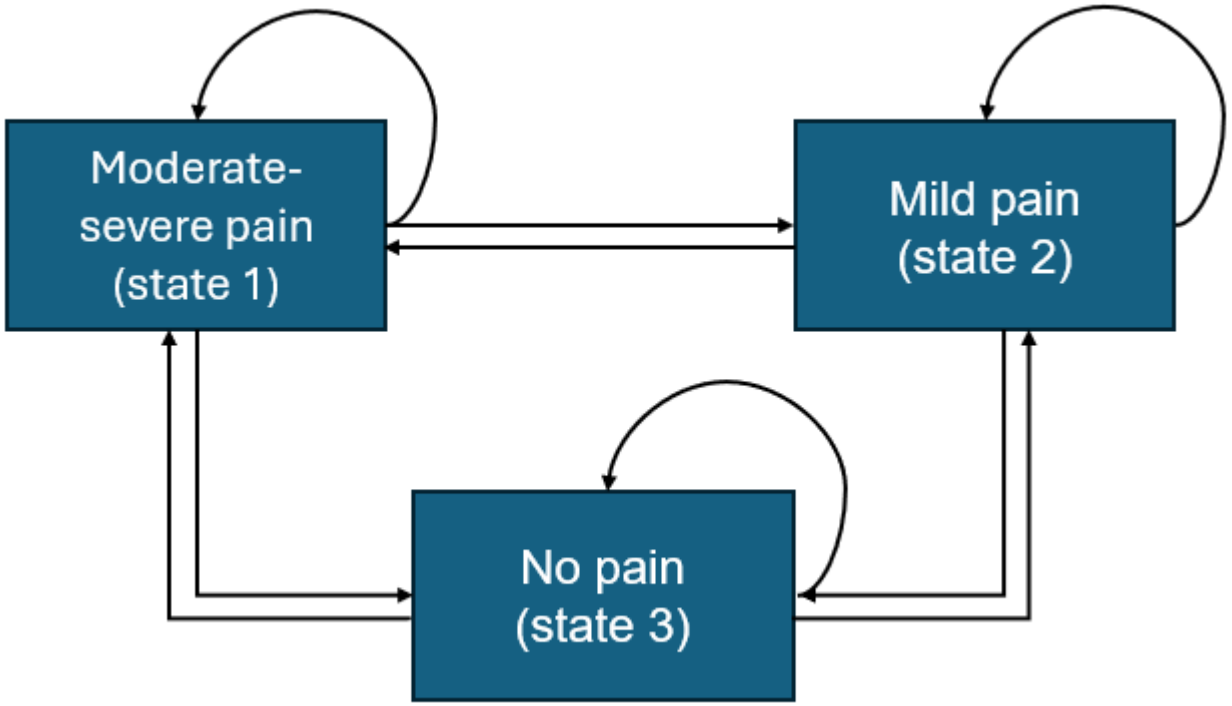
Analytic sample

English Longitudinal Study of Ageing

9,369 ELSA participants aged 50-98 years old who reported mild, moderate, or severe pain during waves 1-10 (2002/03-2021/23)

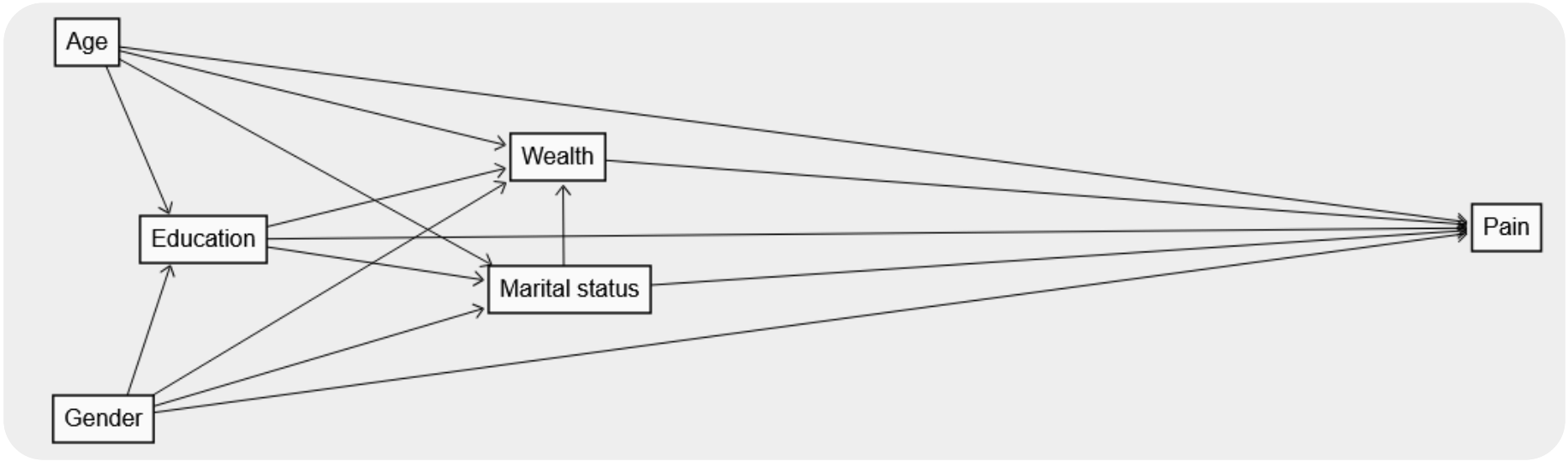
Baseline wave considered to be wave at first reporting pain

Pain severity



Transition probabilities modelled using continuous time interval-censored multi-state models → hazard ratios for covariate associations with each transition

Directed acyclic graph



Results

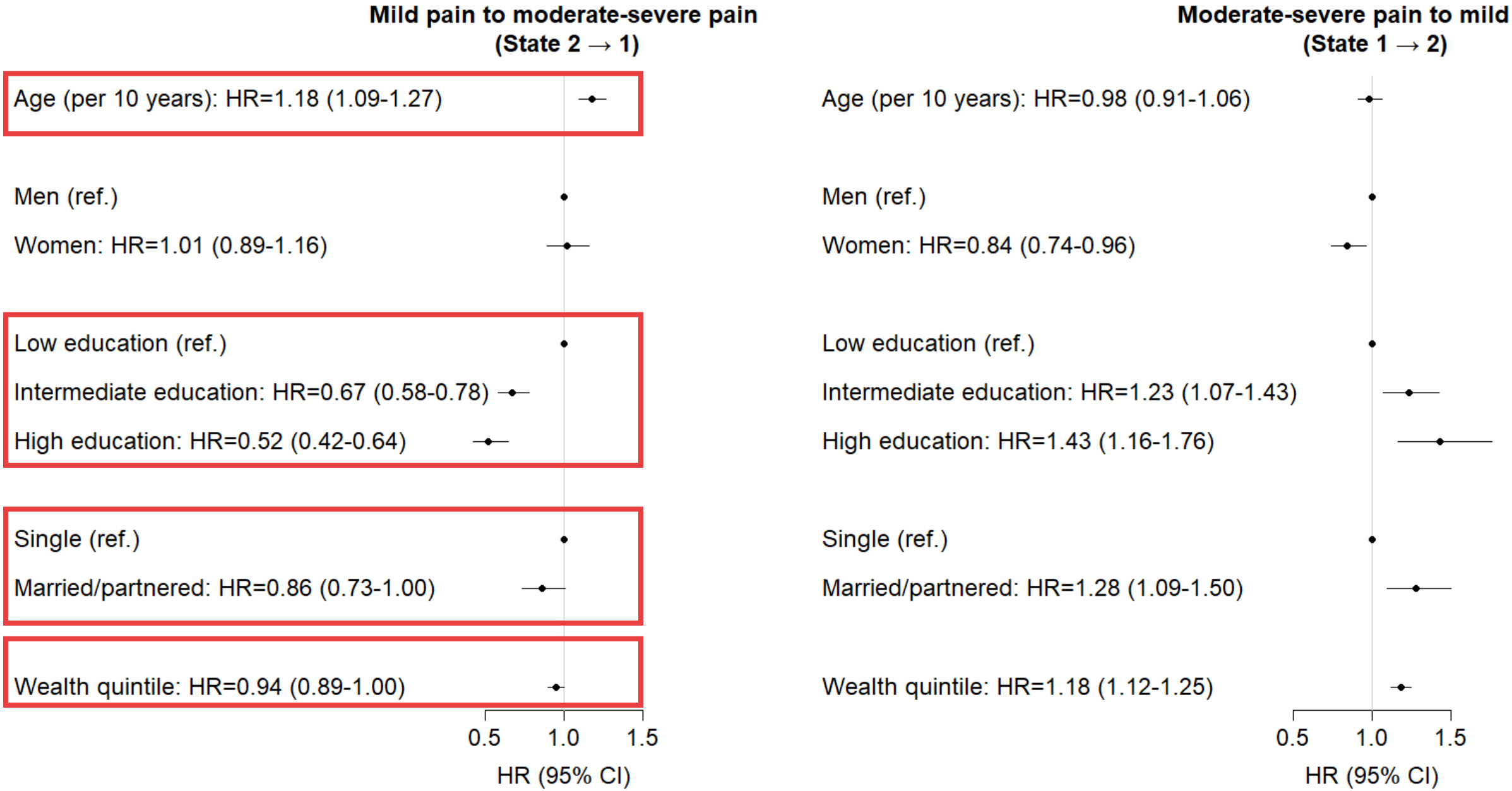
Median follow-up period for:

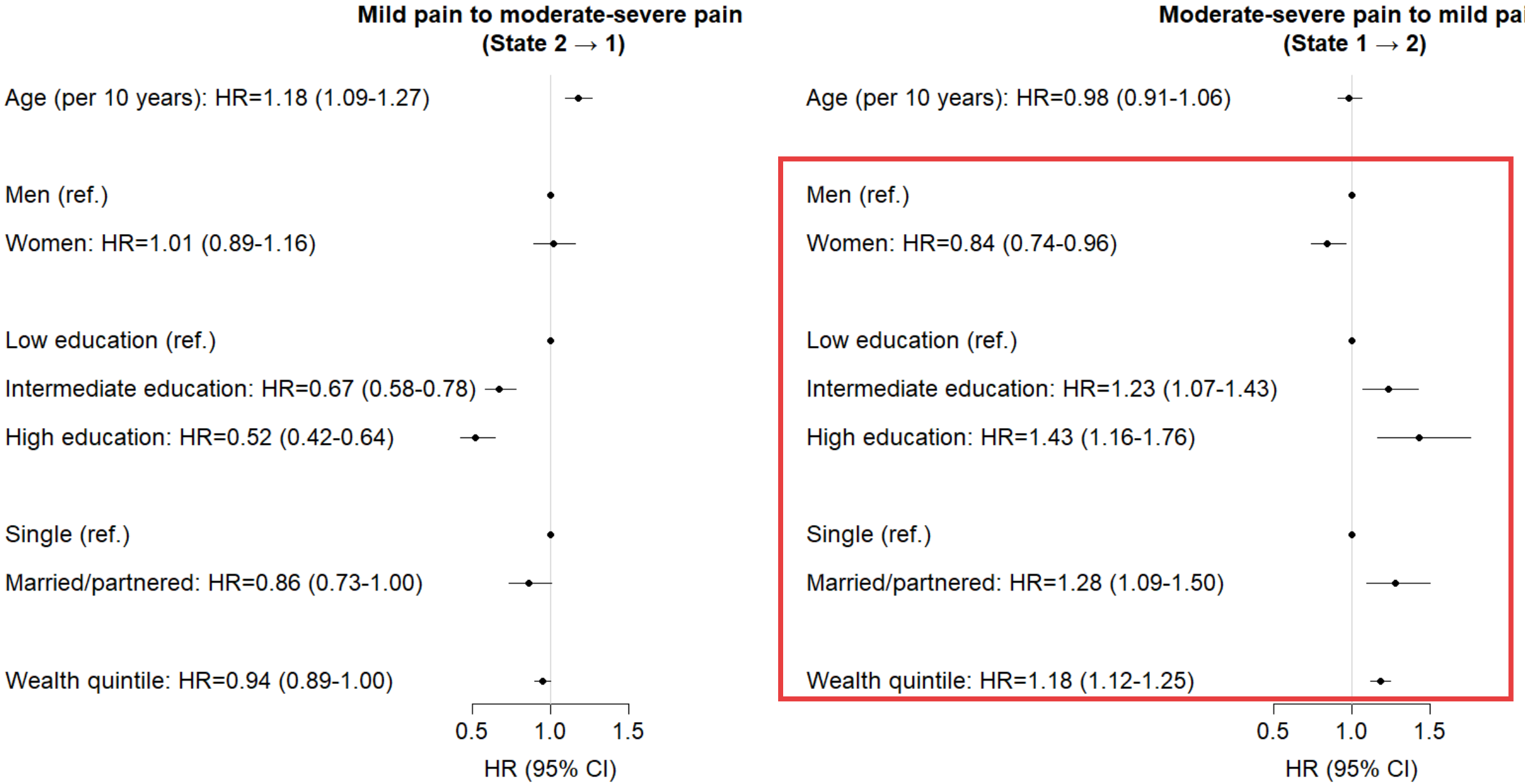
- Moderate-severe pain was 9.4 years (IQR = 4.3-13.8)
- Mild pain was 9.6 years (IQR = 5.2-13.8)

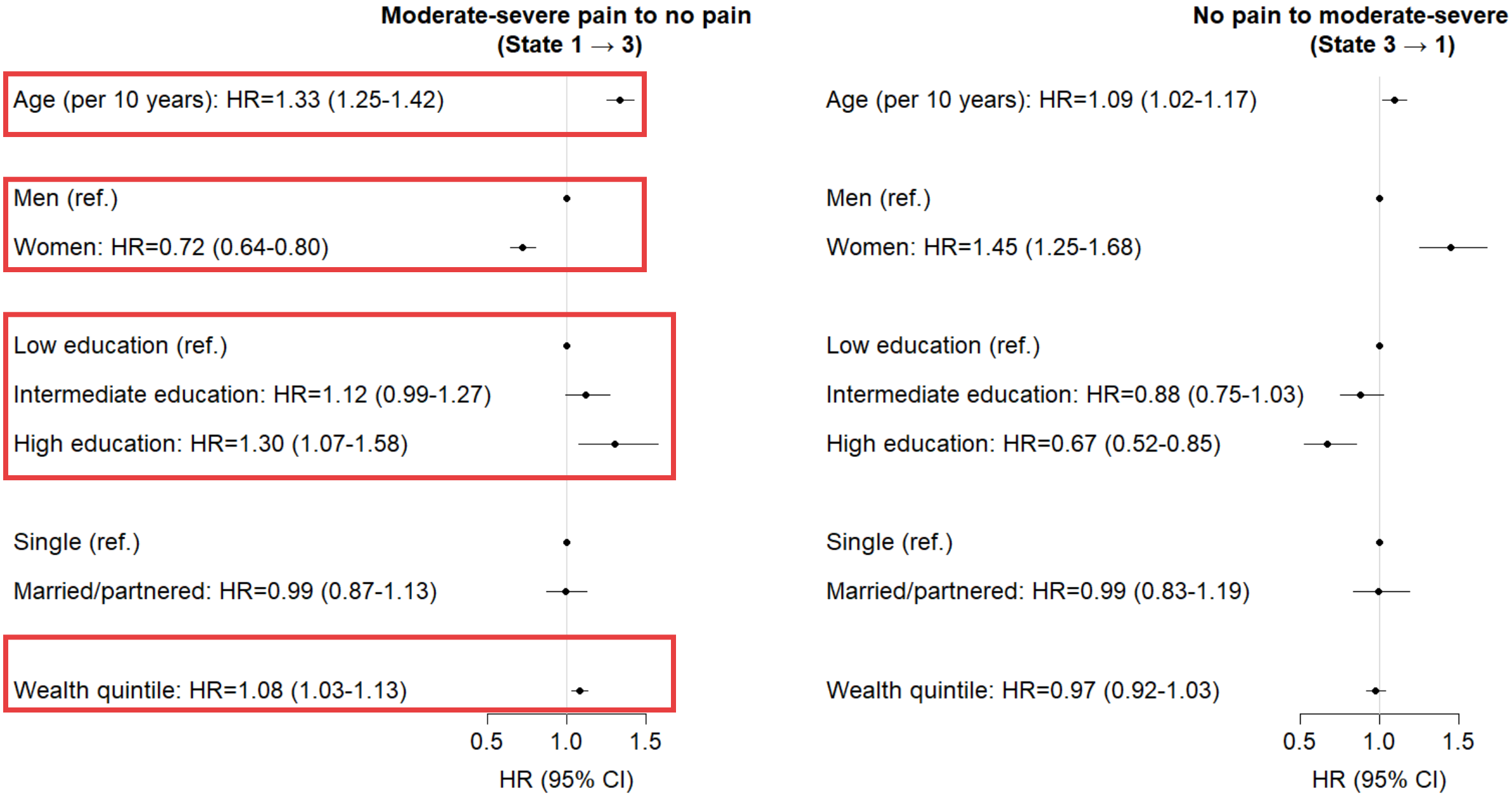
Table 1. Participant characteristics at baseline.

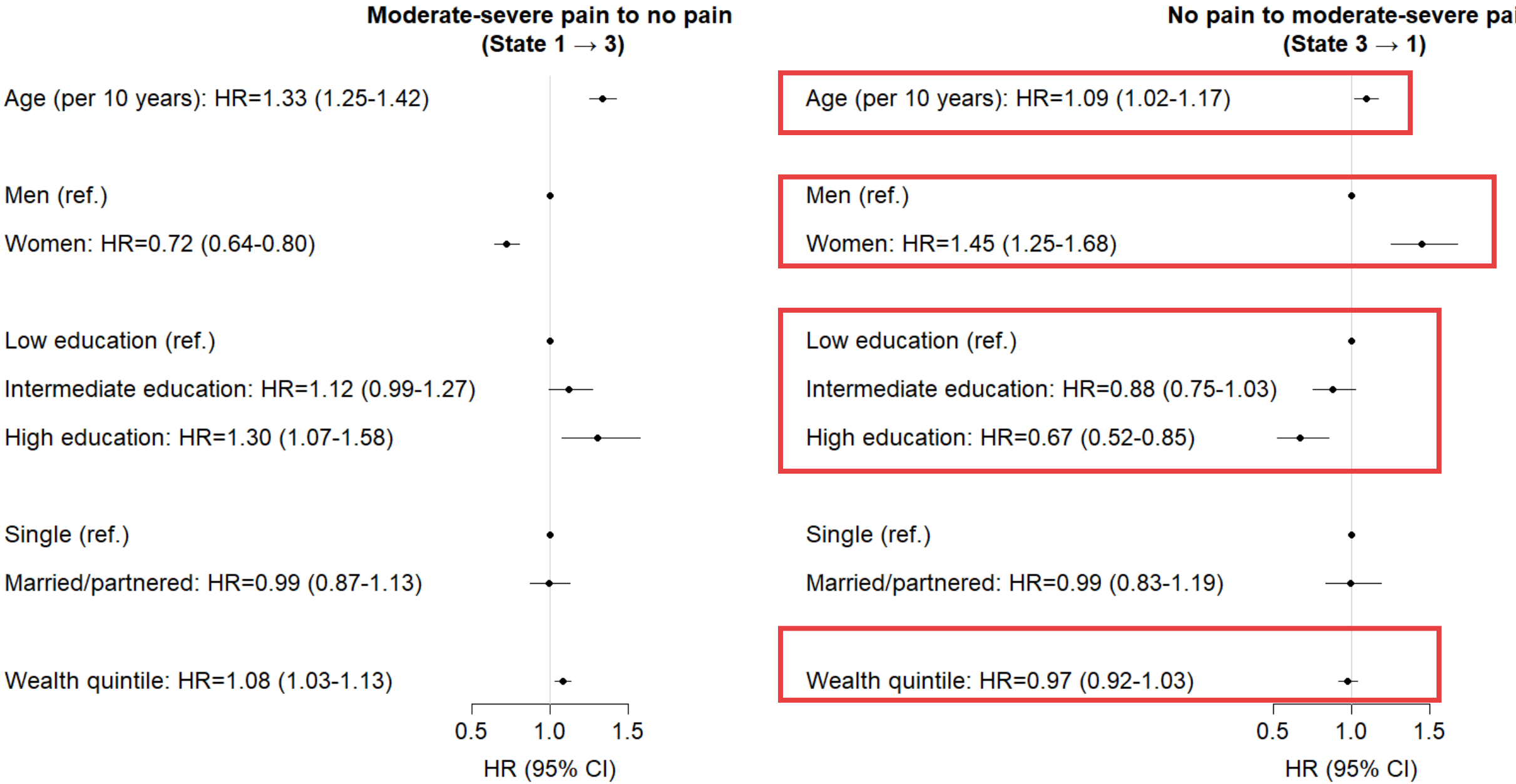
	Moderate-severe pain (N=5,872)	Mild pain (N=3,497)	*P-value*
Age in years, mean (SD)	64·2 (9·9)	62·9 (9·4)	<0·0001
Sex			
Male	2311 (39·4)	1680 (48·0)	<0·0001
Female	3561 (60·6)	1817 (52·0)	
Marital status			
Single	1773 (30·2)	772 (22·1)	<0·0001
Married/partnered	4099 (69·8)	2725 (77·9)	
Highest educational qualifications			
Less than high school diploma	2828 (48·2)	1125 (32·2)	<0·0001
High School diploma	2447 (41·7)	1701 (48·6)	
Above high school diploma	597 (10·2)	671 (19·2)	
Wealth quintile			
1 (Lowest)	1240 (21·1)	443 (12·7)	<0·0001
2	1213 (20·7)	573 (16·4)	
3	1238 (21·1)	675 (19·3)	
4	1162 (19·8)	829 (23·7)	
5 (Highest)	1019 (17·4)	977 (27·9)	

N (%) unless otherwise indicated.
Abbreviations: SD, standard deviation.


Mild pain to moderate-severe pain
(State 2 → 1)
Age (per 10 years): HR=1.18 (1.09-1.27)
Men (ref.)
Women: HR=1.01 (0.89-1.16)
Low education (ref.)
Intermediate education: HR=0.67 (0.58-0.78)
High education: HR=0.52 (0.42-0.64)
Single (ref.)
Married/partnered: HR=0.86 (0.73-1.00)
Wealth quintile: HR=0.94 (0.89-1.00)
0.5
1.0
1.5
HR (95% CI)
Moderate-severe pain to mild pain
(State 1 → 2)
Age (per 10 years): HR=0.98 (0.91-1.06)
Men (ref.)
Women: HR=0.84 (0.74-0.96)
Low education (ref.)
Intermediate education: HR=1.23 (1.07-1.43)
High education: HR=1.43 (1.16-1.76)
Single (ref.)
Married/partnered: HR=1.28 (1.09-1.50)
Wealth quintile: HR=1.18 (1.12-1.25)
0.5
1.0
1.5
HR (95% CI)


Mild pain to moderate-severe pain
(State 2 → 1)
Age (per 10 years): HR=1.18 (1.09-1.27)
Men (ref.)
Women: HR=1.01 (0.89-1.16)
Low education (ref.)
Intermediate education: HR=0.67 (0.58-0.78)
High education: HR=0.52 (0.42-0.64)
Single (ref.)
Married/partnered: HR=0.86 (0.73-1.00)
Wealth quintile: HR=0.94 (0.89-1.00)
0.5
1.0
1.5
HR (95% CI)
Moderate-severe pain to mild pain
(State 1 → 2)
Age (per 10 years): HR=0.98 (0.91-1.06)
Men (ref.)
Women: HR=0.84 (0.74-0.96)
Low education (ref.)
Intermediate education: HR=1.23 (1.07-1.43)
High education: HR=1.43 (1.16-1.76)
Single (ref.)
Married/partnered: HR=1.28 (1.09-1.50)
Wealth quintile: HR=1.18 (1.12-1.25)
0.5
1.0
1.5
HR (95% CI)


Moderate-severe pain to no pain
(State 1 → 3)
Age (per 10 years): HR=1.33 (1.25-1.42)
Men (ref.)
Women: HR=0.72 (0.64-0.80)
Low education (ref.)
Intermediate education: HR=1.12 (0.99-1.27)
High education: HR=1.30 (1.07-1.58)
Single (ref.)
Married/partnered: HR=0.99 (0.87-1.13)
Wealth quintile: HR=1.08 (1.03-1.13)
0.5
1.0
1.5
HR (95% CI)
No pain to moderate-severe pain
(State 3 → 1)
Age (per 10 years): HR=1.09 (1.02-1.17)
Men (ref.)
Women: HR=1.45 (1.25-1.68)
Low education (ref.)
Intermediate education: HR=0.88 (0.75-1.03)
High education: HR=0.67 (0.52-0.85)
Single (ref.)
Married/partnered: HR=0.99 (0.83-1.19)
Wealth quintile: HR=0.97 (0.92-1.03)
0.5
1.0
1.5
HR (95% CI)


Moderate-severe pain to no pain
(State 1 → 3)
Age (per 10 years): HR=1.33 (1.25-1.42)
Men (ref.)
Women: HR=0.72 (0.64-0.80)
Low education (ref.)
Intermediate education: HR=1.12 (0.99-1.27)
High education: HR=1.30 (1.07-1.58)
Single (ref.)
Married/partnered: HR=0.99 (0.87-1.13)
Wealth quintile: HR=1.08 (1.03-1.13)
0.5
1.0
1.5
HR (95% CI)
No pain to moderate-severe pain
(State 3 → 1)
Age (per 10 years): HR=1.09 (1.02-1.17)
Men (ref.)
Women: HR=1.45 (1.25-1.68)
Low education (ref.)
Intermediate education: HR=0.88 (0.75-1.03)
High education: HR=0.67 (0.52-0.85)
Single (ref.)
Married/partnered: HR=0.99 (0.83-1.19)
Wealth quintile: HR=0.97 (0.92-1.03)
0.5
1.0
1.5
HR (95% CI)

Sensitivity analysis

Results were consistent when we:

1. Re-categorised pain states (state 1: no/mild pain; state 2: moderate pain; state 3: severe pain)
2. Considered only individuals who reported pain at the wave following the baseline wave (i.e., reported pain at two consecutive waves)

Limitations and directions for future research

Participants must have two waves of data to be included and analytic sample might be healthier than ELSA study population

Individuals with worse pain might be more likely to drop out of study so results reflect those with less severe pain

Inability to distinguish between chronic pain and other types o pain

Subjective pain severity

ELSA is primarily white

Future studies should examine generalisability of results, clarify differences between acute and chronic pain and causes of pain, and the role of pain treatments and therapies

Conclusion and implications

Importance of gender and SEP:

- Pain in women less likely to improve in severity, less likely to go into remission, and more likely to recur
- Higher SEP = pain that is more likely to improve in severity, less likely to worsen, more likely to go into remission, and less likely to recur

Findings support policy that promotes:

- Gender-sensitive strategies, like sex-specific criteria for diagnosing pain and guidelines to address gender biases in clinical practice
- Accessible pain management

Thank you for listening!

Co-authors

Dr Feifei Bu

Dr Giorgio Di Gessa

Professor Daisy Fancourt

Professor Andrew Steptoe

Funders

Nuffield Foundation

VERSUS ARTHRITIS

NIH National Institute on Aging