

Epidemiology: Life trajectories of lean, fat and bone mass

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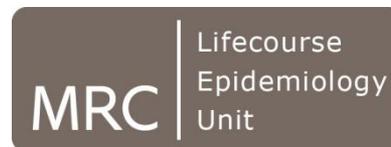
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and

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Conflict of interest statement: *CC has received lecture fees and consulting honoraria from Amgen, MSD, Eli Lilly, Procter & Gamble, Aventis, GSK/Roche, Novartis, Nycomed, Radius, Servier, UCB and Wyeth Pharmaceuticals.*



Body composition trajectories throughout the lifecourse

- Bone mass trajectory through lifecourse
- Implications for prevention from conception to old age
- Linkage in trajectories of bone, muscle and fat

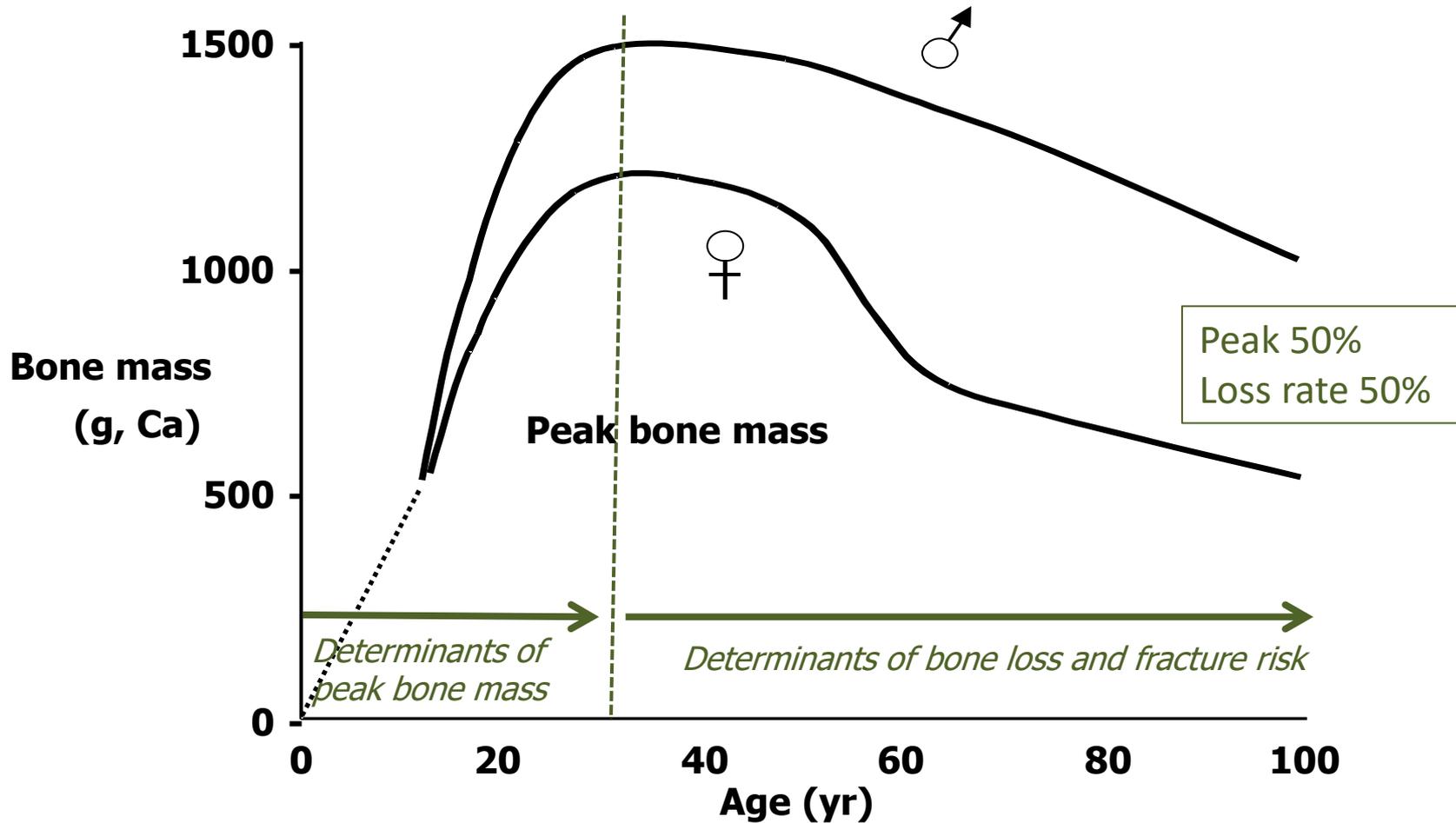


MRC Lifecourse Epidemiology Unit,
University of Southampton



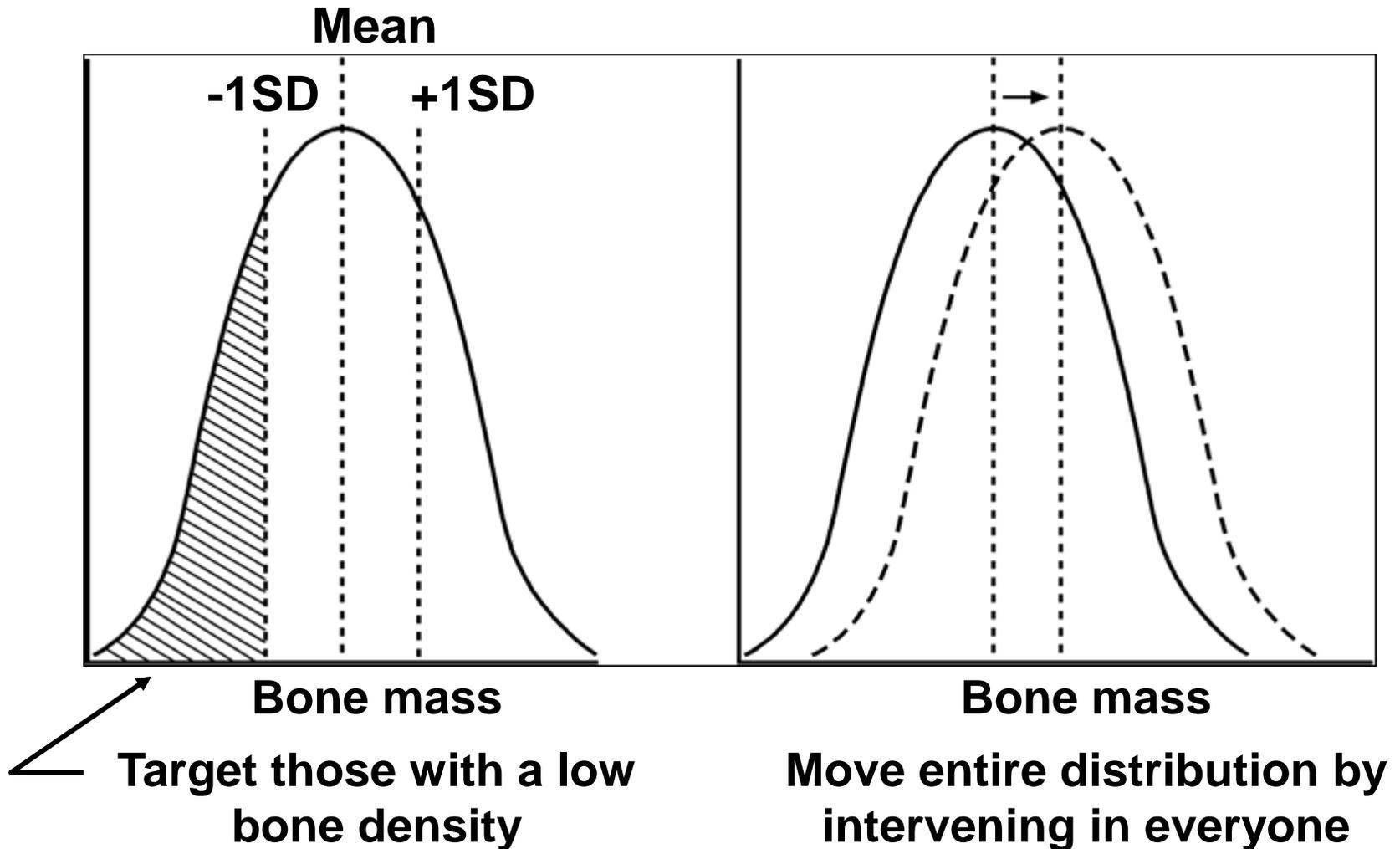
Institute of Musculoskeletal Science,
University of Oxford

Bone mass across the lifecourse: gain and loss

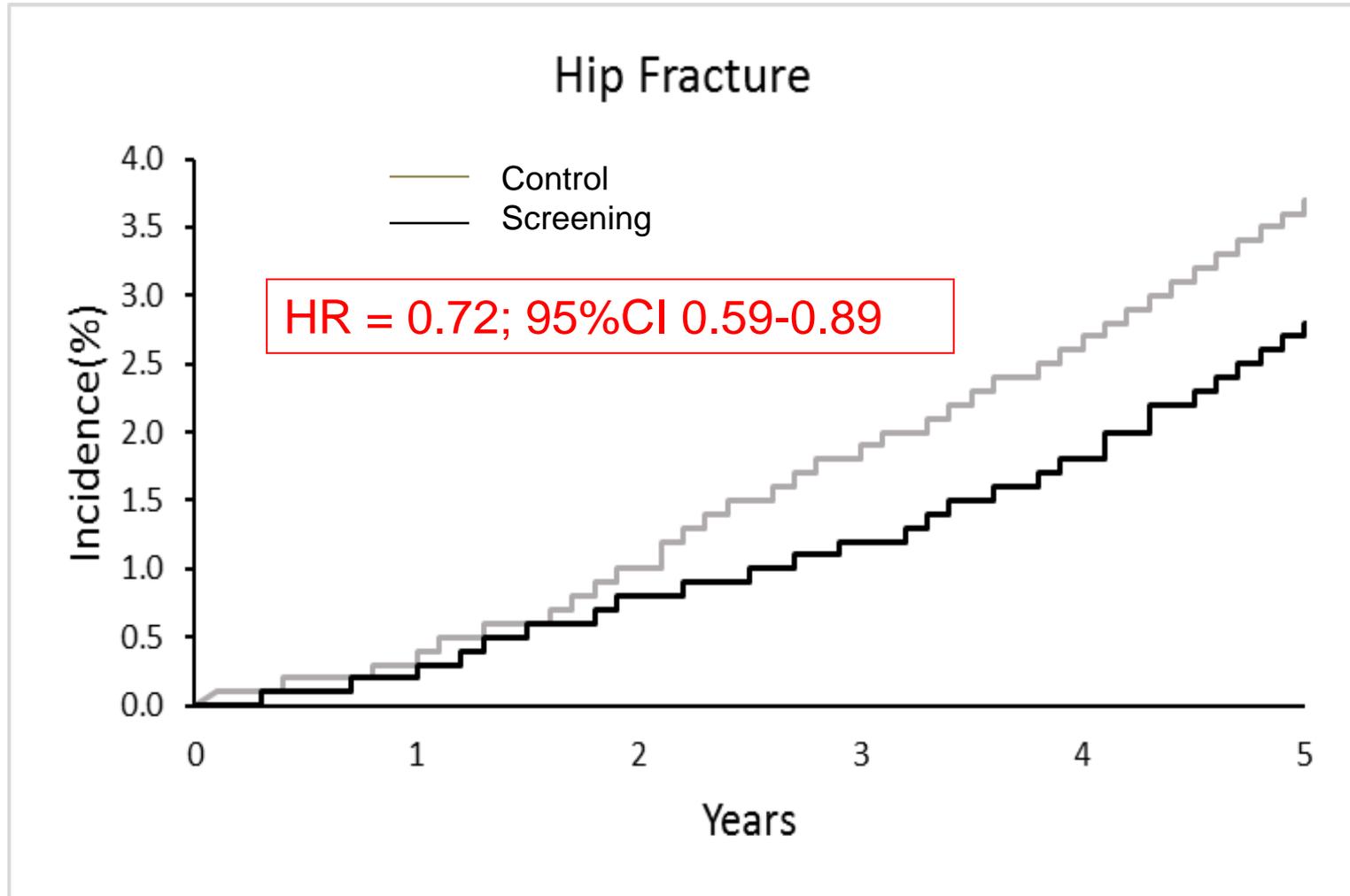


PEAK BONE MASS		RATE OF BONE LOSS	
Gene	Nutrition	Menopause	Dietary Ca/D
Physical activity	Hormonal status	Body mass	Physical activity
		Smoking	Diseases
		Alcohol	Drugs (GC)

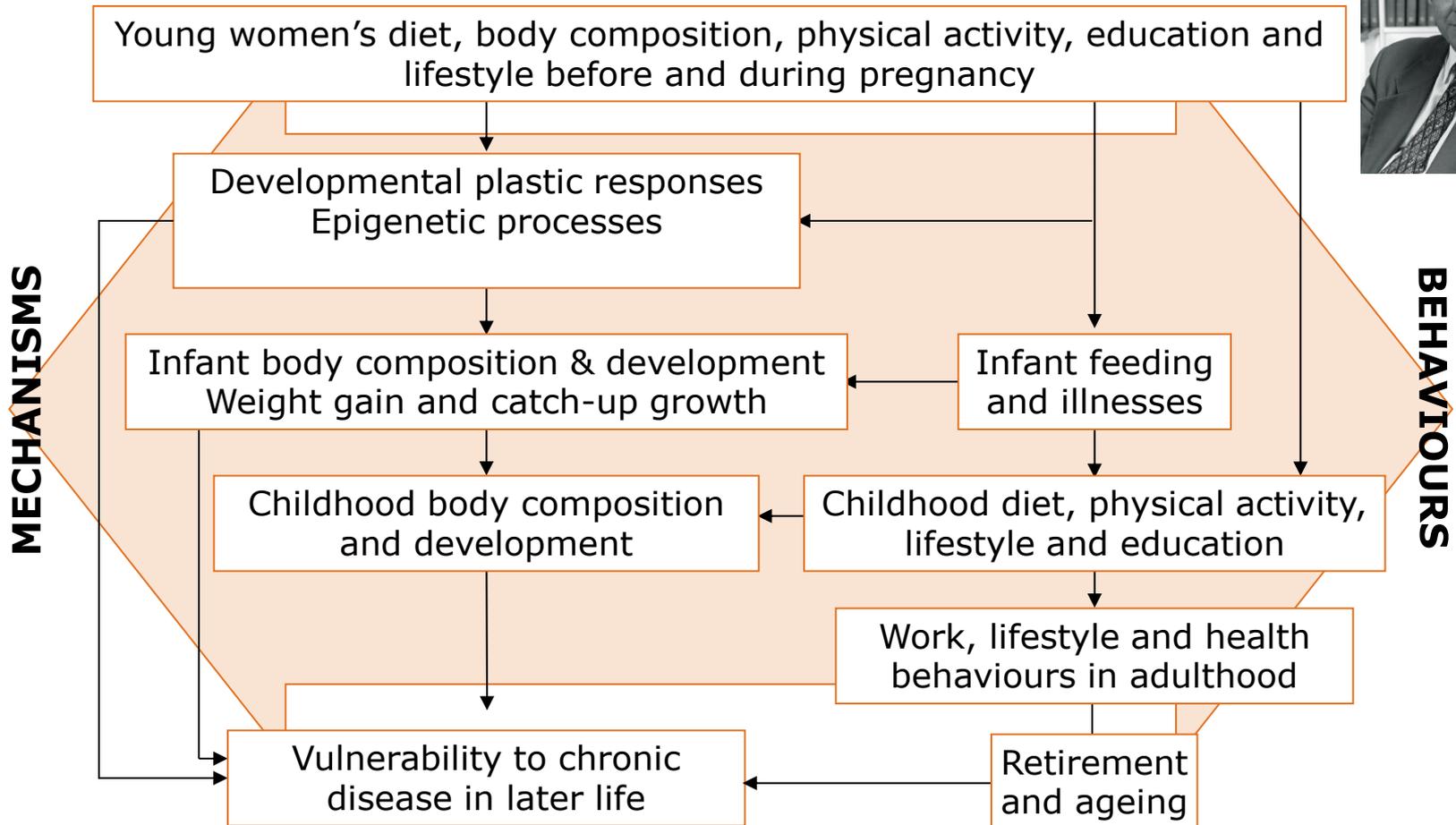
Preventive strategies: High-risk and population approaches



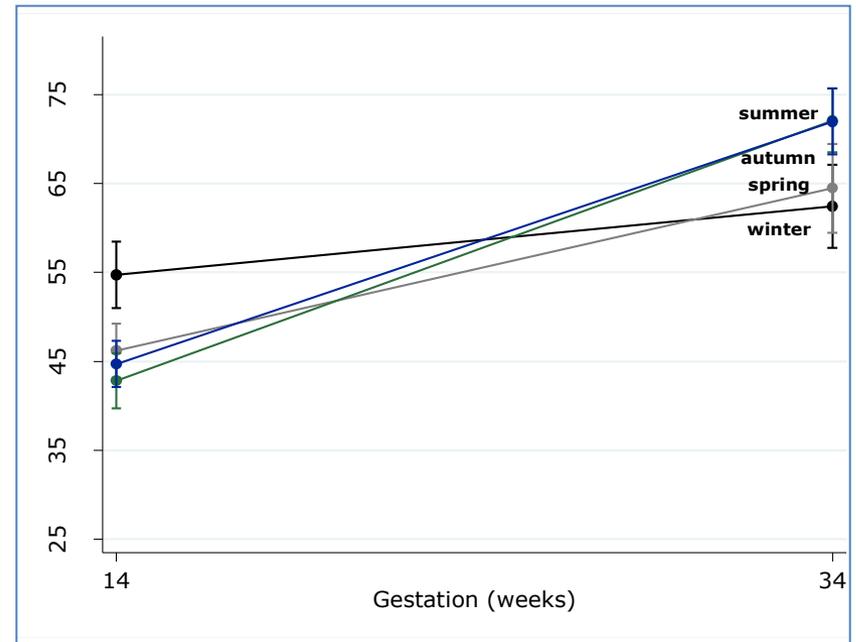
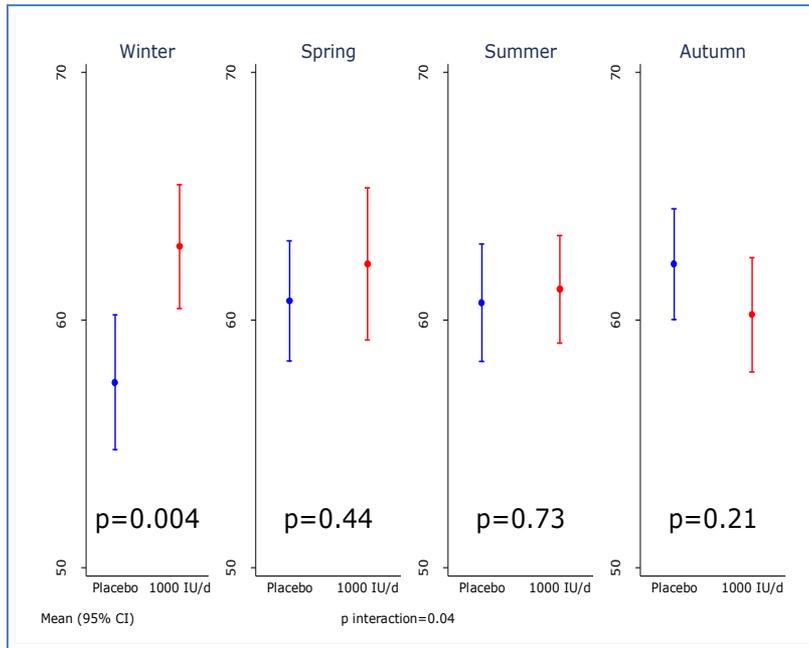
Screening based on clinical risk factors and FRAX leads to reduced risk of hip fracture



Lifecourse determinants of health and disease: A conceptual framework

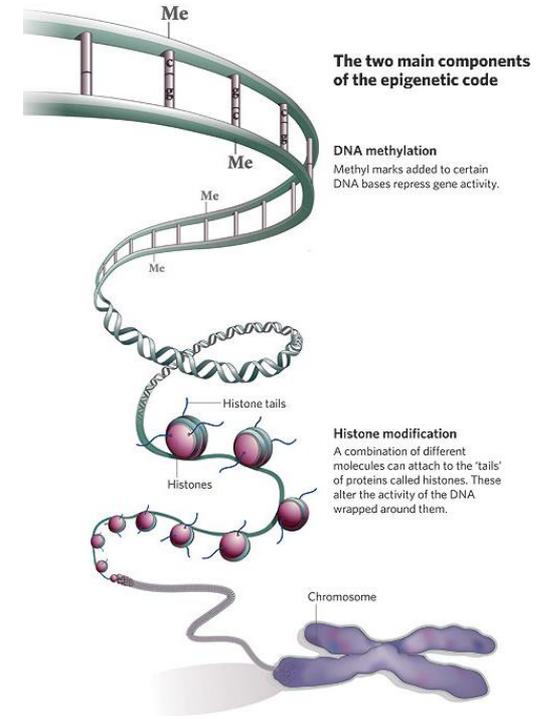
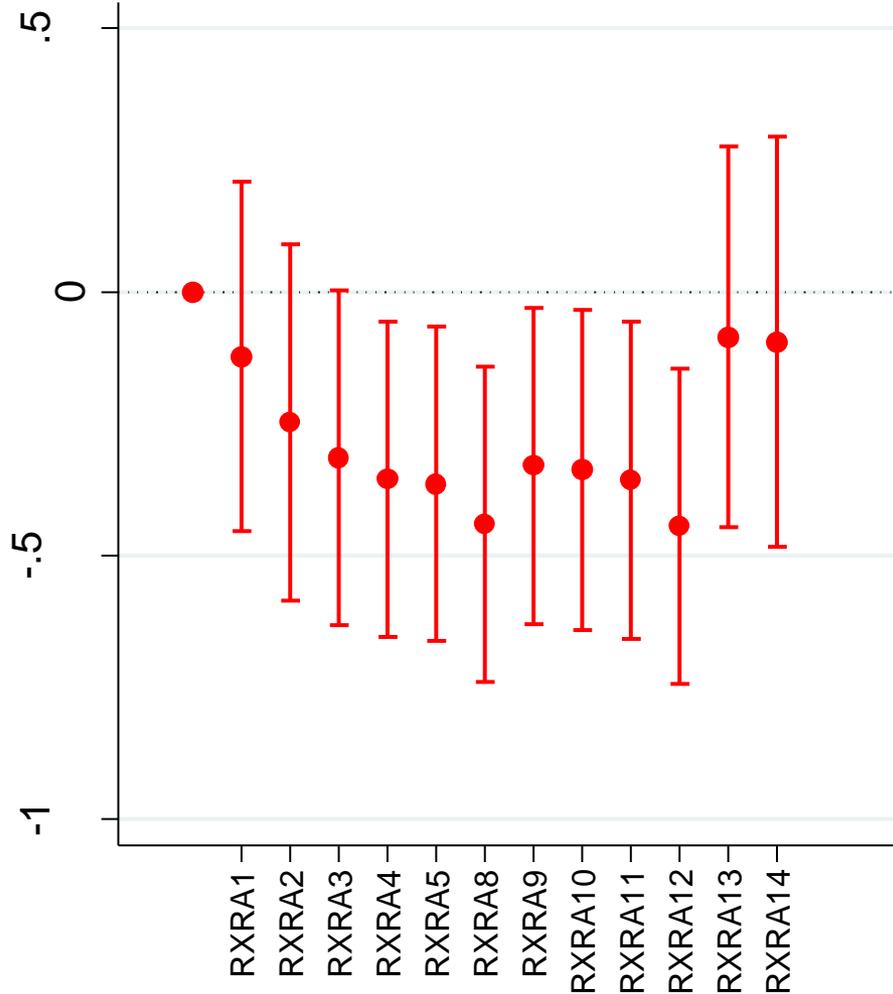


Vitamin D supplementation increases offspring BMC in winter births by eliminating steep winter decline in maternal vitamin D status: MAVIDOS Trial



Gestational vitamin D supplementation leads to reduced perinatal RXRA methylation (MAVIDOS)

1000 IU/d vs. Placebo



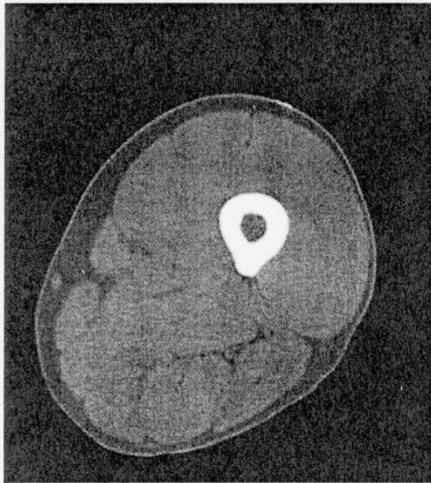
DNA methylation

Prevention of fragility fracture throughout the lifecourse

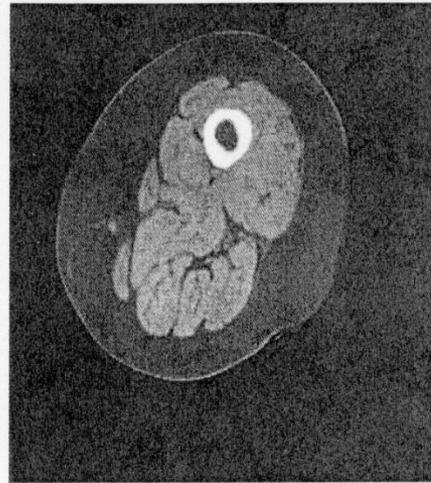
Conclusions

- Population/individual mortality and morbidity burden attributable to osteoporotic fracture established
- Risk assessment well validated through FRAX, and widely incorporated in international treatment guidelines
- Effectiveness of FRAX-based programmes for treatment targeting demonstrable and cost-effective (MRC SCOOP)
- Secondary preventive strategies well designed, widely available and cost-effective
- Novel approaches point at prevention throughout the lifecourse

Sarcopenia



Young, active



Old, sedentary

“A syndrome characterised by progressive, generalised loss of skeletal muscle mass and strength with the risk of adverse outcomes such as physical disability, poor quality of life and death.”

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English translation and validation of the SarQoL[®], a quality of life questionnaire specific for sarcopenia

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Components:

- Muscle mass
- Muscle strength
- Physical performance

ICD-10 Registration 2016

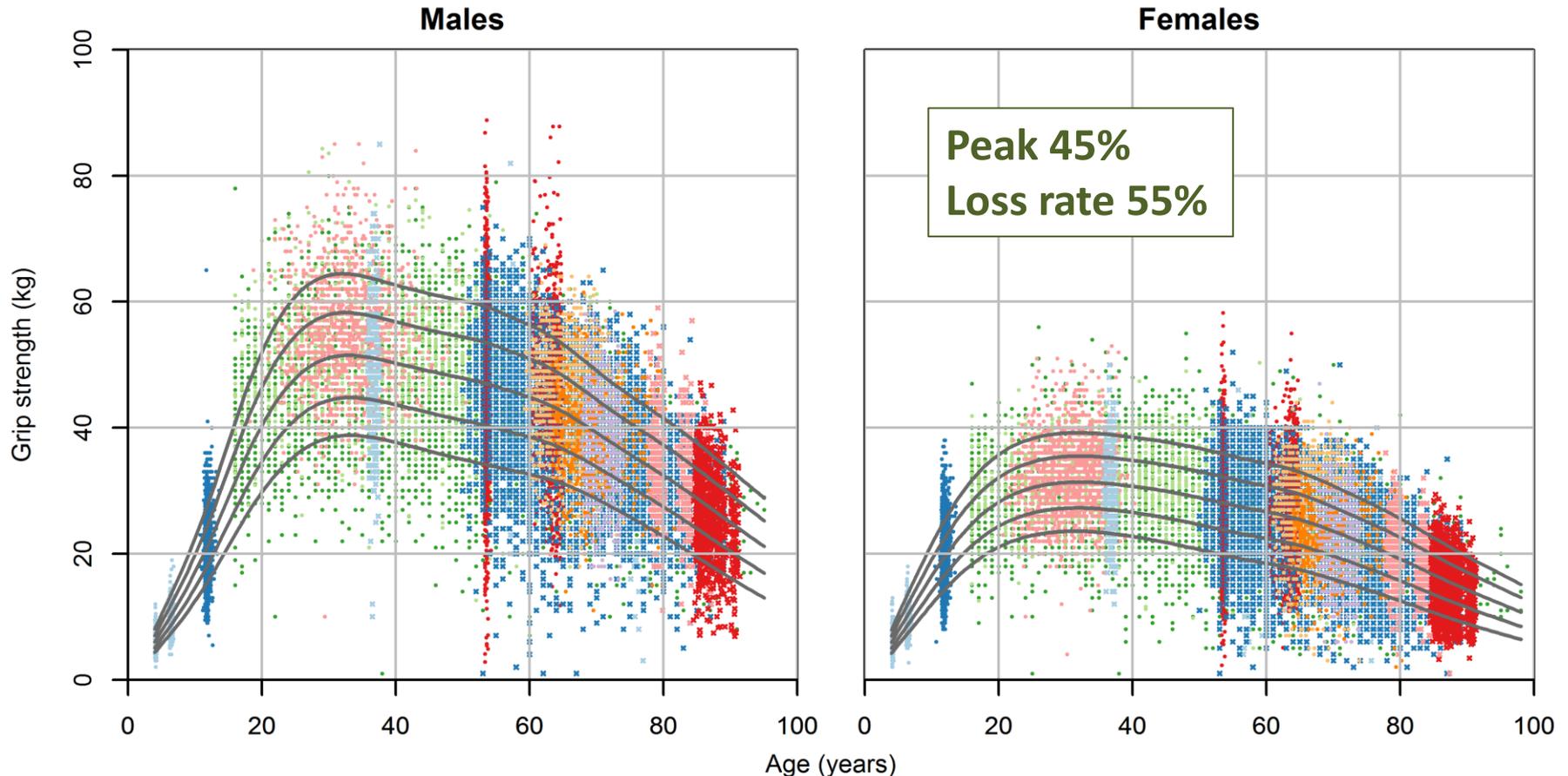
Novel approaches to definition:

- EWGSOP-2
- SDOC (FNIH-2)

Muscle strength across the lifecourse

12 population studies in Great Britain; 60,803 observations from 49,964 participants (26,687 female)

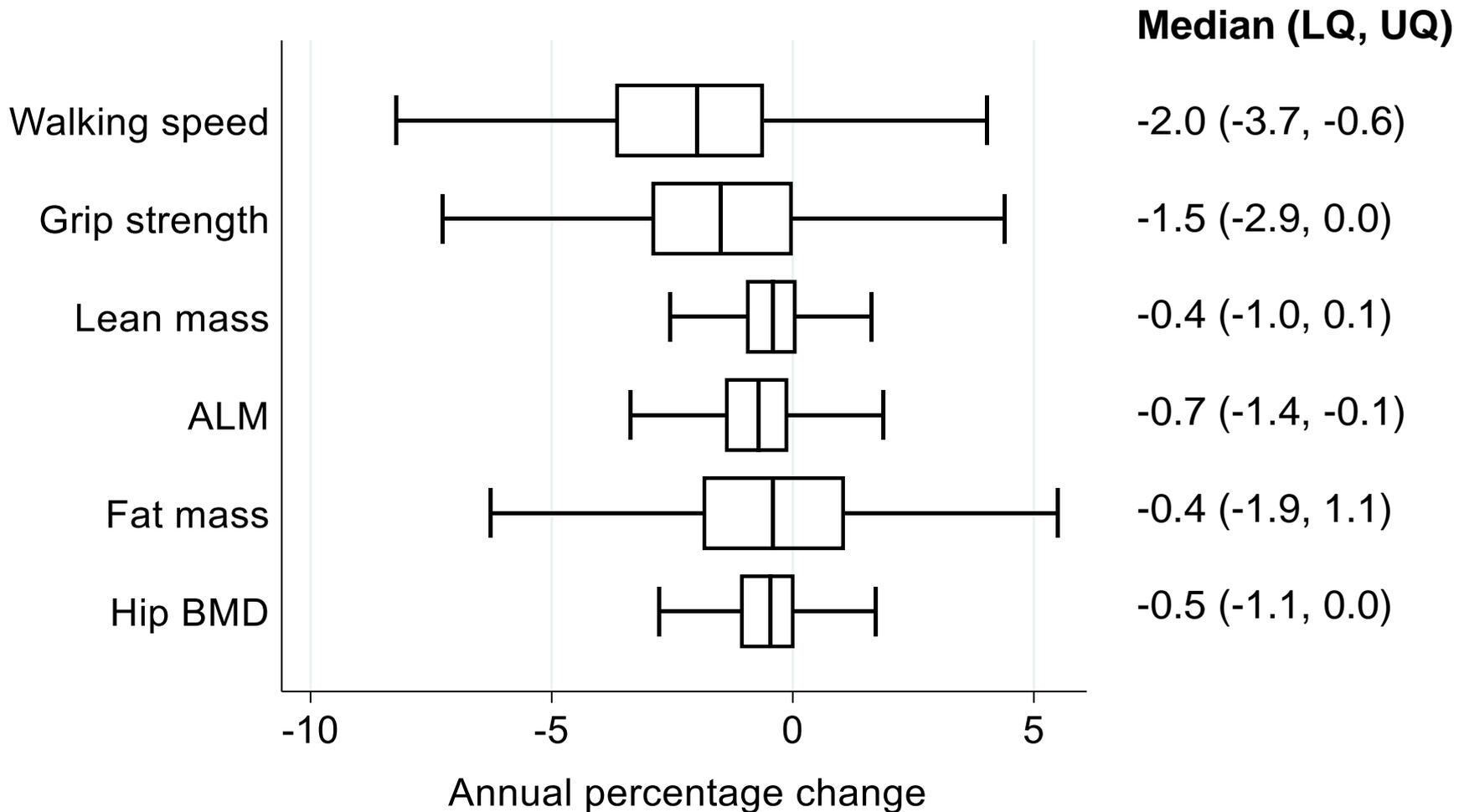
Cross-cohort centile curves for grip strength.



Study (ordered by age at first wave of data collection, youngest first):

• SWS • ALSPAC • ADNFS • UKHLS • SWSmp × T07 × ELSA • NSHD • HCS • HAS • LBC1936 × LBC1921 × N85

Annual percentage change in muscle function and body composition: HealthABC



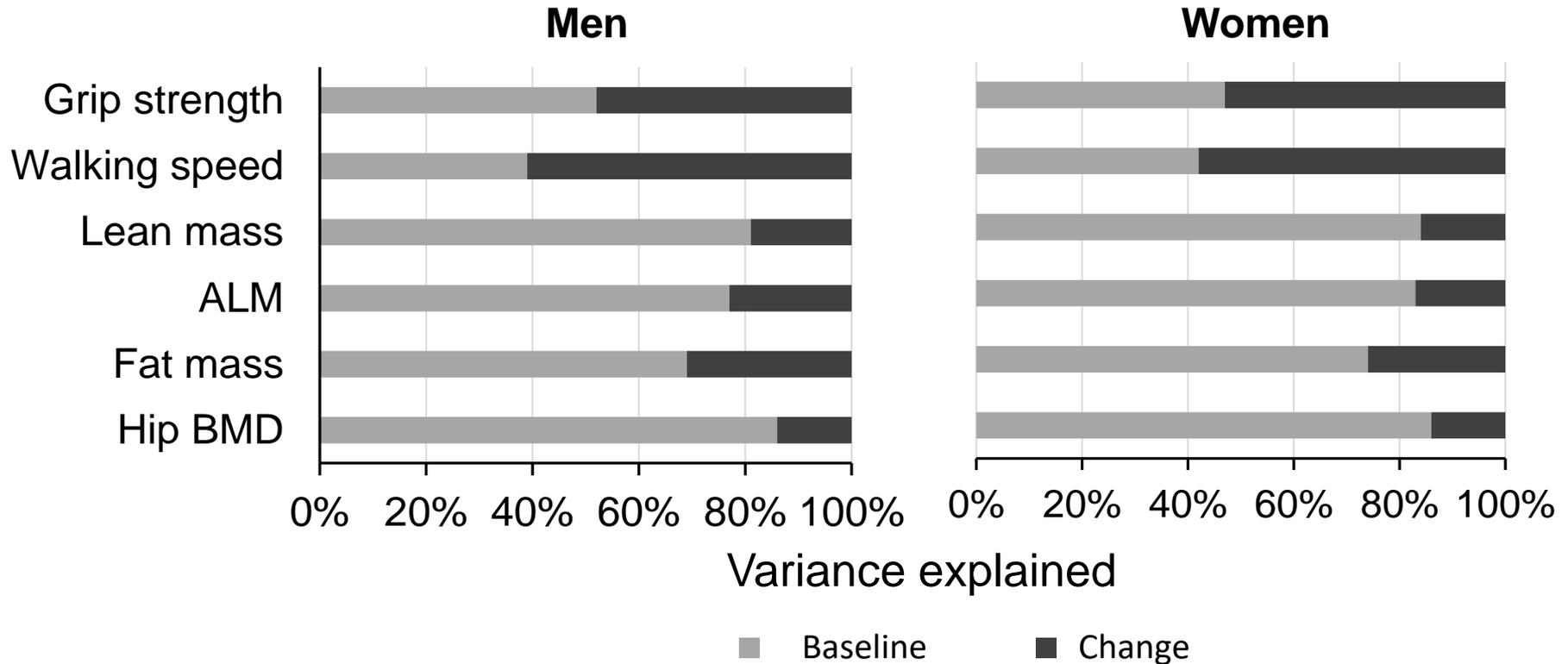
Boxes show median, lower quartile and upper quartile

Relationships between conditional change measures

Measures	Grip strength	Walking speed	Lean mass	ALM	Fat mass
Walking speed	0.16				
<i>P-value</i>	<0.001				
Lean mass	0.24	0.08			
<i>P-value</i>	<0.001	0.002			
ALM	0.24	0.08	0.89		
<i>P-value</i>	<0.001	0.004	<0.001		
Fat mass	0.11	0.06	0.55	0.46	
<i>P-value</i>	<0.001	0.039	<0.001	<0.001	
Hip BMD	0.22	0.21	0.42	0.34	0.39
<i>P-value</i>	<0.001	<0.001	<0.001	<0.001	<0.001

ALM: Appendicular lean mass; Correlations where $r > 0.3$ are in red

Proportion of variance at Year 10 explained by baseline level and change since baseline

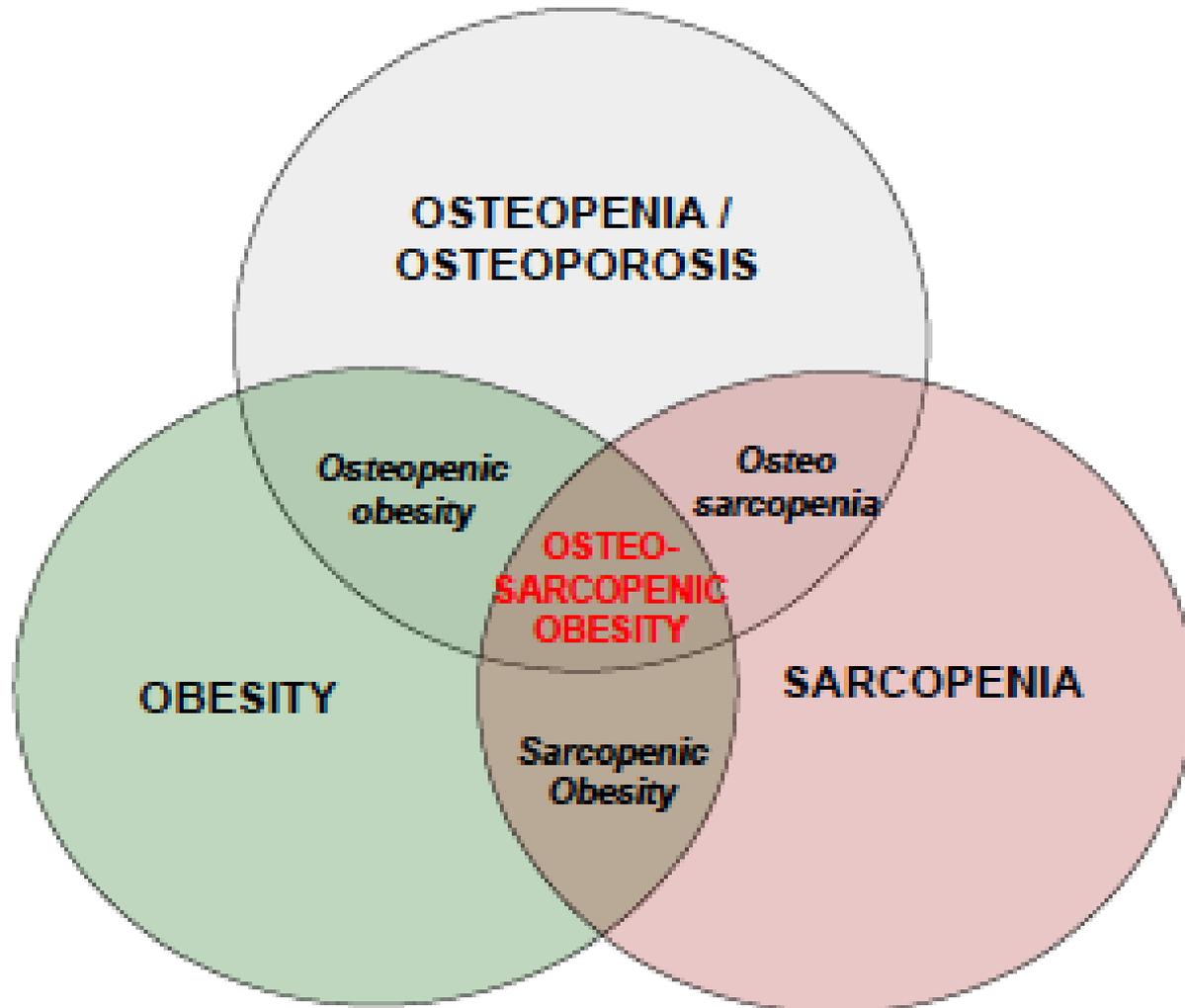


Conditional change measures were derived for each characteristic

Conclusions

- All indices of body composition and muscle function show significant age-related declines
- Among muscle indices, proportionate declines over 10 years greatest for gait speed, then grip strength and lean mass
- Latent trajectory models identify subgroups with more pronounced differences in levels of characteristics, as compared with rates of loss
- Trajectories of change in indices of body composition (lean mass, ALM, fat mass and hip BMD), more strongly correlated with each other, than between these and gait speed or grip strength
- Extension to studying trajectories in multiple cohorts
- Findings support a lifecourse approach to preventive strategies, rather than purely a focus on environmental influences in later life

Linked Pathophysiologic Entity: Osteosarcopenic Obesity?



With thanks to all at Southampton, Oxford and Health ABC

