WEAKNESS, OBESITY, AND DISABILITY IN OLDER ADULTS: THE PREVENTABLE TRIAD

HARMONIZING, OPERATIONALIZING AND UNDERSTANDING DYNAPENIC OBESITY: A GLOBAL PERSPECTIVE

Todd Manini, Ph.D.
Associate Professor

Institute on Aging
UNIVERSITY OF FLORIDA

Sarcopenia Definition and Outcomes Consortium Investigators

PIs: Peggy Cawthon and Shalender Bhasin

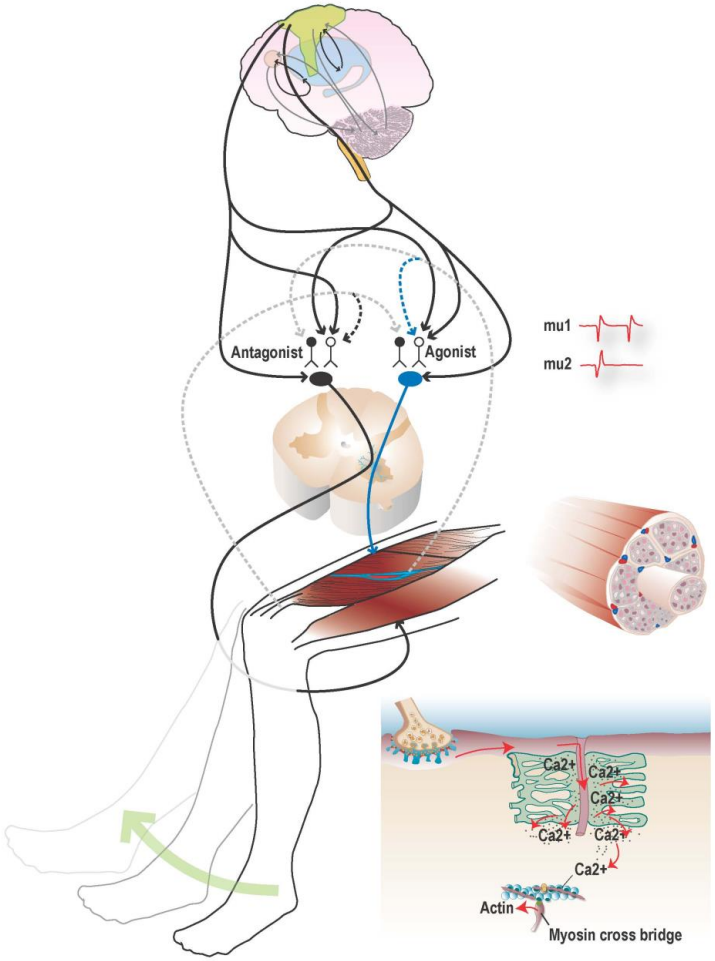
Steering Committee and Analysts: Sheena Patel, Rosaly Correa-De-Araujo, Roger Fielding, Jay Magaziner, Todd Manini, Thomas Travison, Karol Pencina, Hao Zhu

Project Investigators: Shehzad Basaria, Ellen Binder, Todd Brown, Ralph D'Agostino, Susan Greenspan, Tamara Harris, Douglas Kiel, Steven Kritchevsky, Joe Massaro, Robert McLean, Anne Newman, Denise Orwig, Marco Pahor, Adam Santanasto, Michelle Shardell, Qian-Li Xue

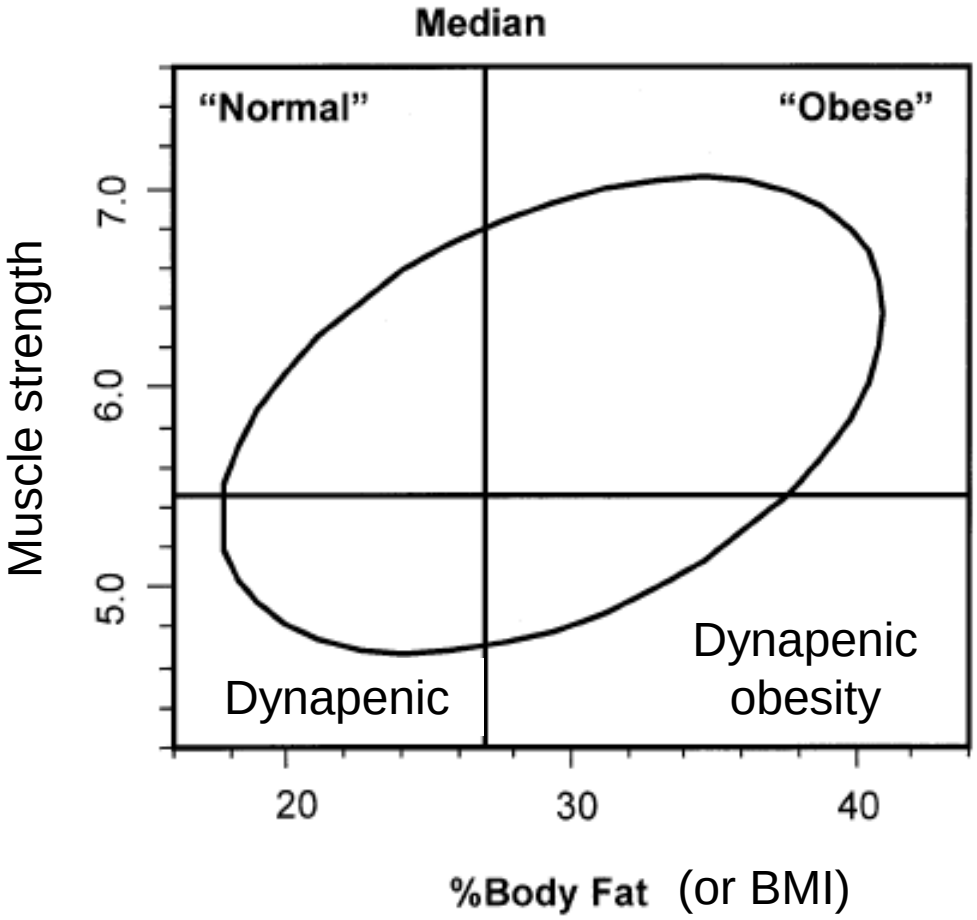
Other Contributing Investigators: Steven R. Cummings, Robert Cumming, Kristine Ensrud, Vasant Harini, Joanne Jordan, Magnus K. Karlsson, Timothy Kwok, Östen Ljunggren, Dan Mellström, Claes Ohlsson, Eric S. Orwoll, Laura Schaap, Jean Woo, Marjolein Visser

On the same page

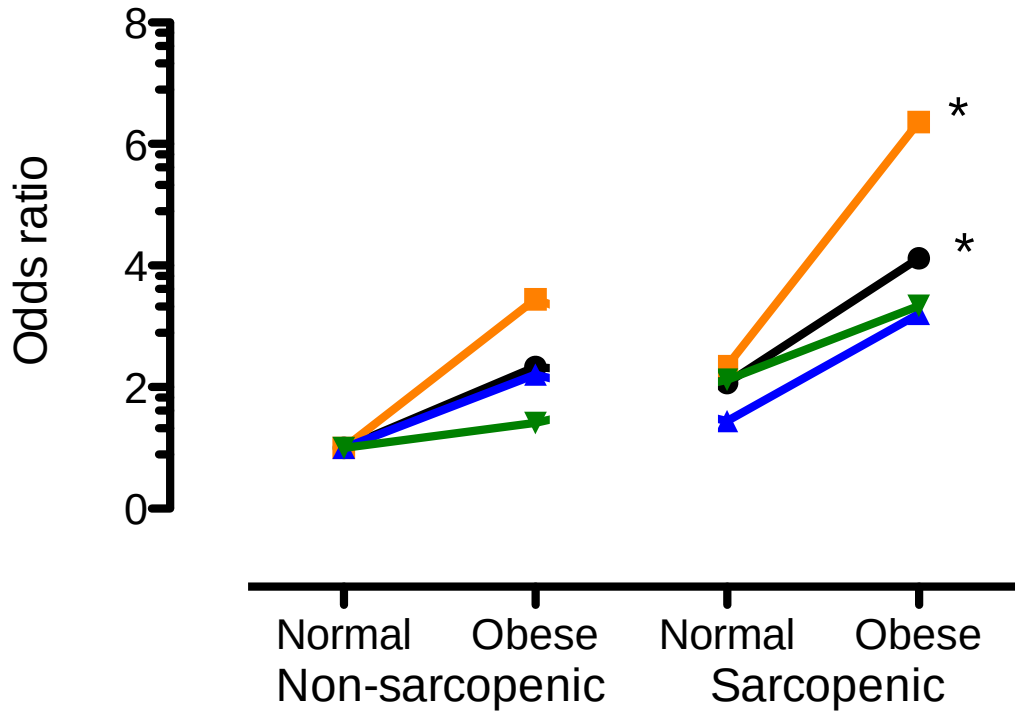
- Obesity
  - abnormal or excessive fat accumulation that may impair health
- Sarcopenia
  - Age-related loss in muscle mass (i.e. flesh)
- Dynapenia
  - Age-related loss in muscle strength/power (i.e. weakness)

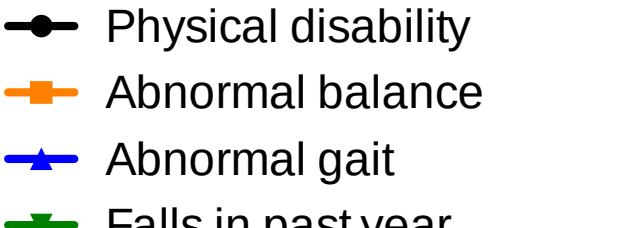


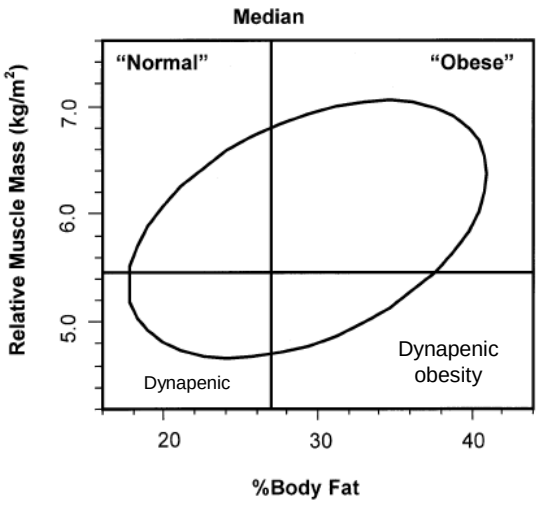
Operational definition of dynapenic obesity



Sarcopenic obesity and functional health







* p<0.05

Baumgartner 2000

Objectives

- To investigate differences in the association between obesity and muscle weakness according to new proposed criteria in a pooled sample of participants from four countries (US, Hong Kong, Australia and Sweden)

- To investigate the association between obesity with and without muscle weakness on health outcomes (mortality and falls) across a racially and regionally diverse sample of participants.

Muscle weakness definitions

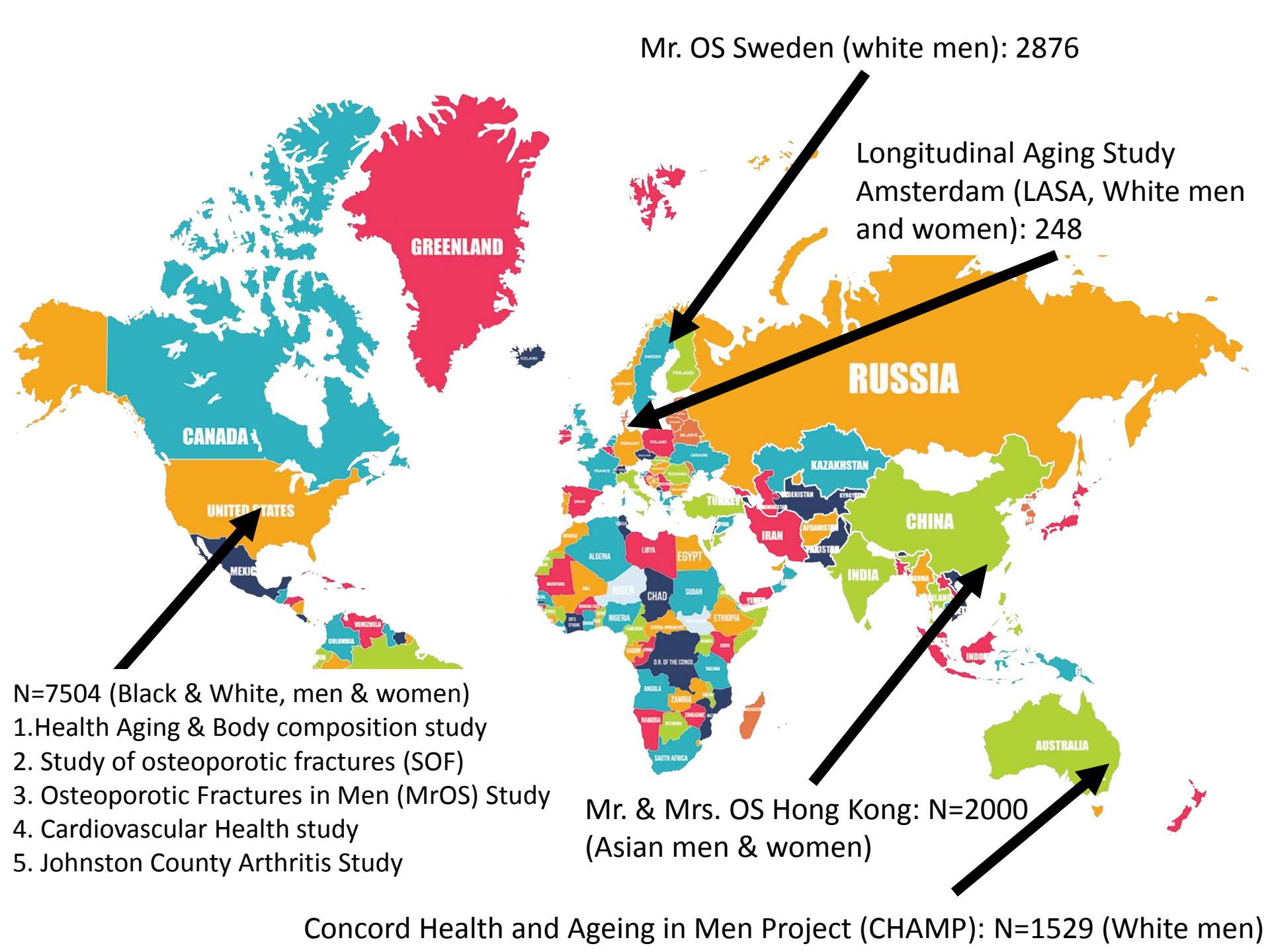
Definition	EWGSOP	FNIH	NIA & FNIH sarcopenia project 2*
Low grip strength (weakness)	Male: < 30 kg Female: < 20 kg	Male: <1.0 kg/bmi (<26 kg) Female: <0.56 kg/bmi (<16 kg)	Male: <=1.05 Female: <=0.79

*results presented in previous symposium: “THE NIA AND FNIH SARCOPENIA PROJECT 2: PROJECT UPDATES AND PRELIMINARY RESULTS”

Methods

- Obesity
  - BMI >=30 (men and women)
  - Body fatness (Gallagher et al. 2000)
    - Men: >=30%
    - Women: >=42%
- Dynapenia – low grip strength according to the NIA & FNIH sarcopenia project 2
  - Men: <=1.05 kg/BMI
  - Women: <=0.79 kg/BMI

+


Mr. OS Sweden (white men): 2876
Longitudinal Aging Study Amsterdam (LASA, White men and women): 248
GREENLAND
CANADA
UNITED STATES
RUSSIA
KAZAKHSTAN
CHINA
IRAN
INDIA
AUSTRALIA
N=7504 (Black & White, men & women)
1.Health Aging & Body composition study
2. Study of osteoporotic fractures (SOF)
3. Osteoporotic Fractures in Men (MrOS) Study
4. Cardiovascular Health study
5. Johnston County Arthritis Study
Mr. & Mrs. OS Hong Kong: N=2000 (Asian men & women)
Concord Health and Ageing in Men Project (CHAMP): N=1529 (White men)

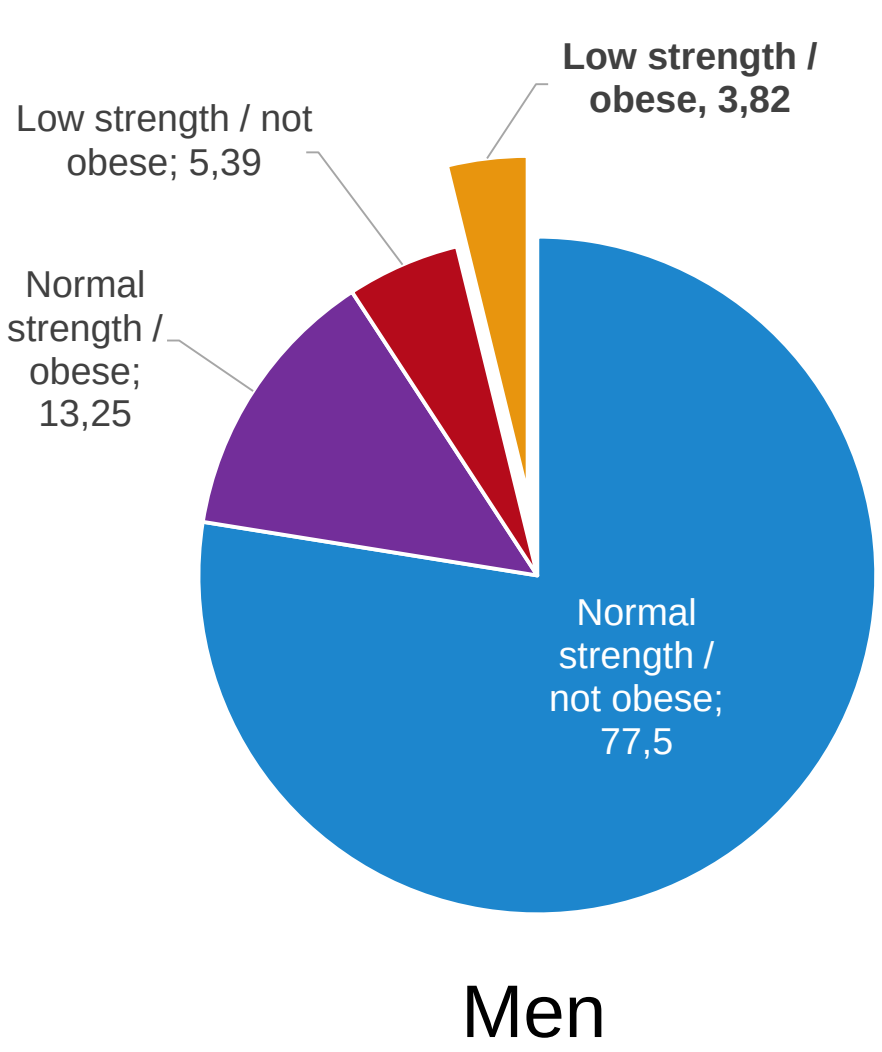
Brief participant characteristics

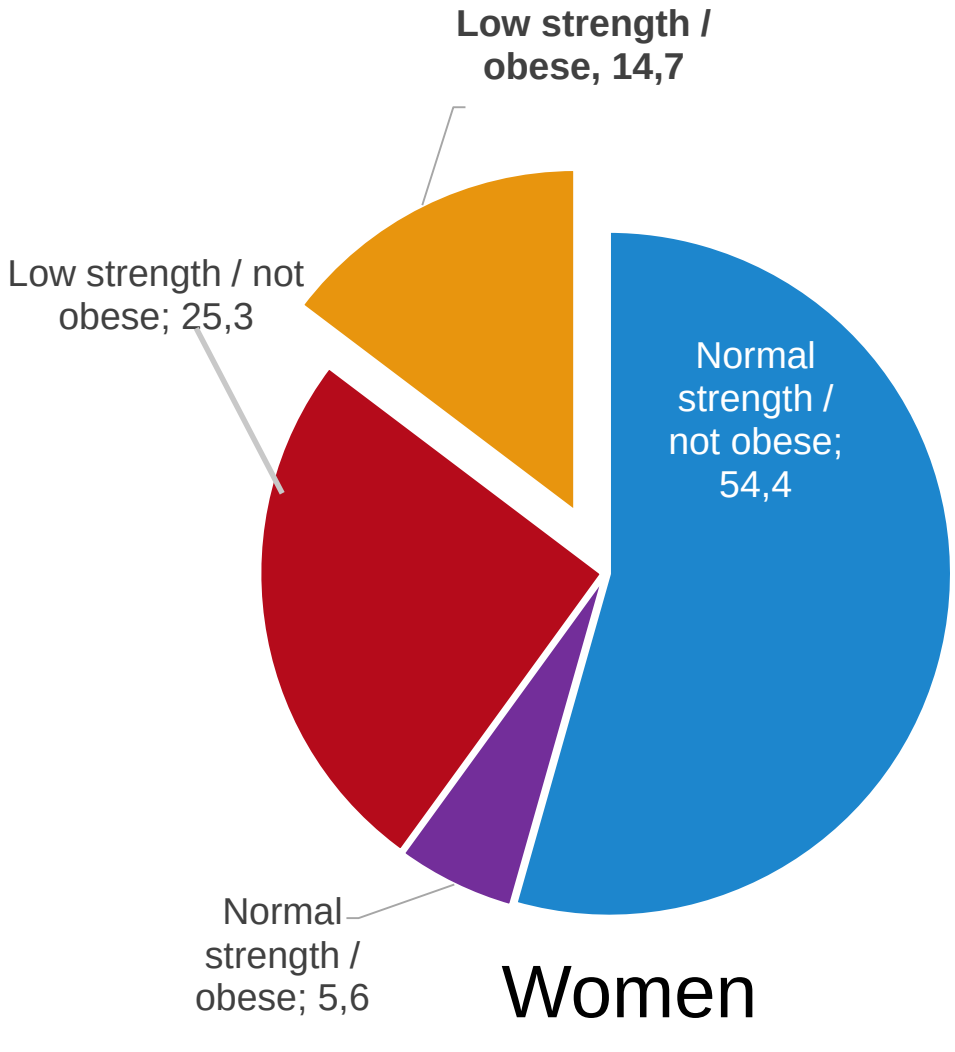
Characteristic	Men	Women
N	14157	5723
Age, yrs, mean +/- SD	74.6 +/- 5.4	75.2 +/- 5.7
White race (USA, EU, AUS), n (%)	11197 (79.1)	2542 (44.4)
Black race (USA), n (%)	579 (4.1)	1176 (20.5)
Asian race (HK), n (%)	2000 (14.1)	2000 (34.9)
Obese (by BMI>=30), n (%)	2411 (17.0)	1152 (20.1)
Obese (by %Fat), n (%)**	3971 (28.0)	1555 (27.2)
Dynapenic*, n (%)	1301 (9.1)	2274 (39.7)

*Men: <=1.05 kg/BMI; Women: <=0.79 kg/BMI

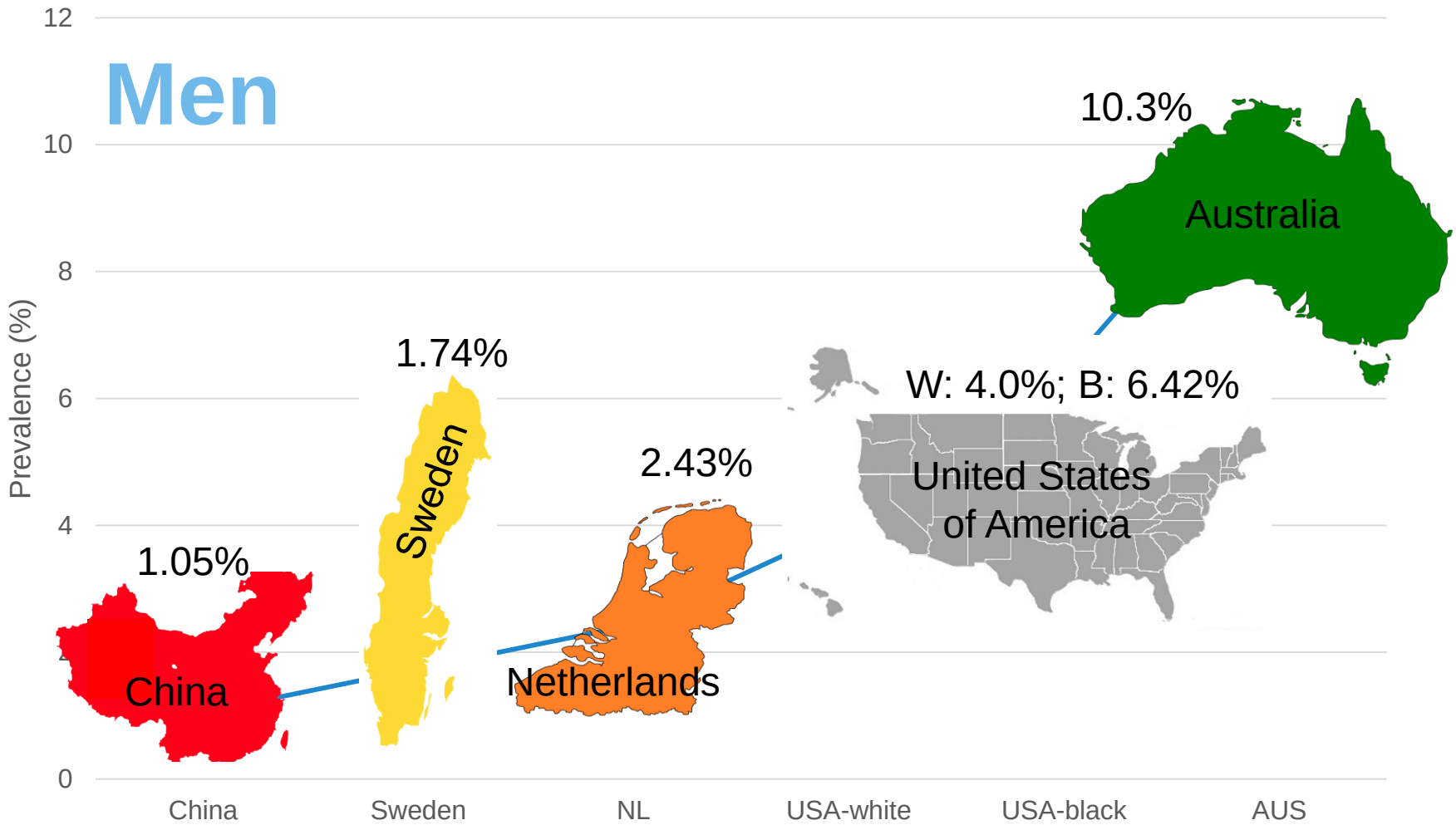
**Percent fat thresholds: Men: >=30%; Women: >=42%

Obesity (by BMI) & weakness



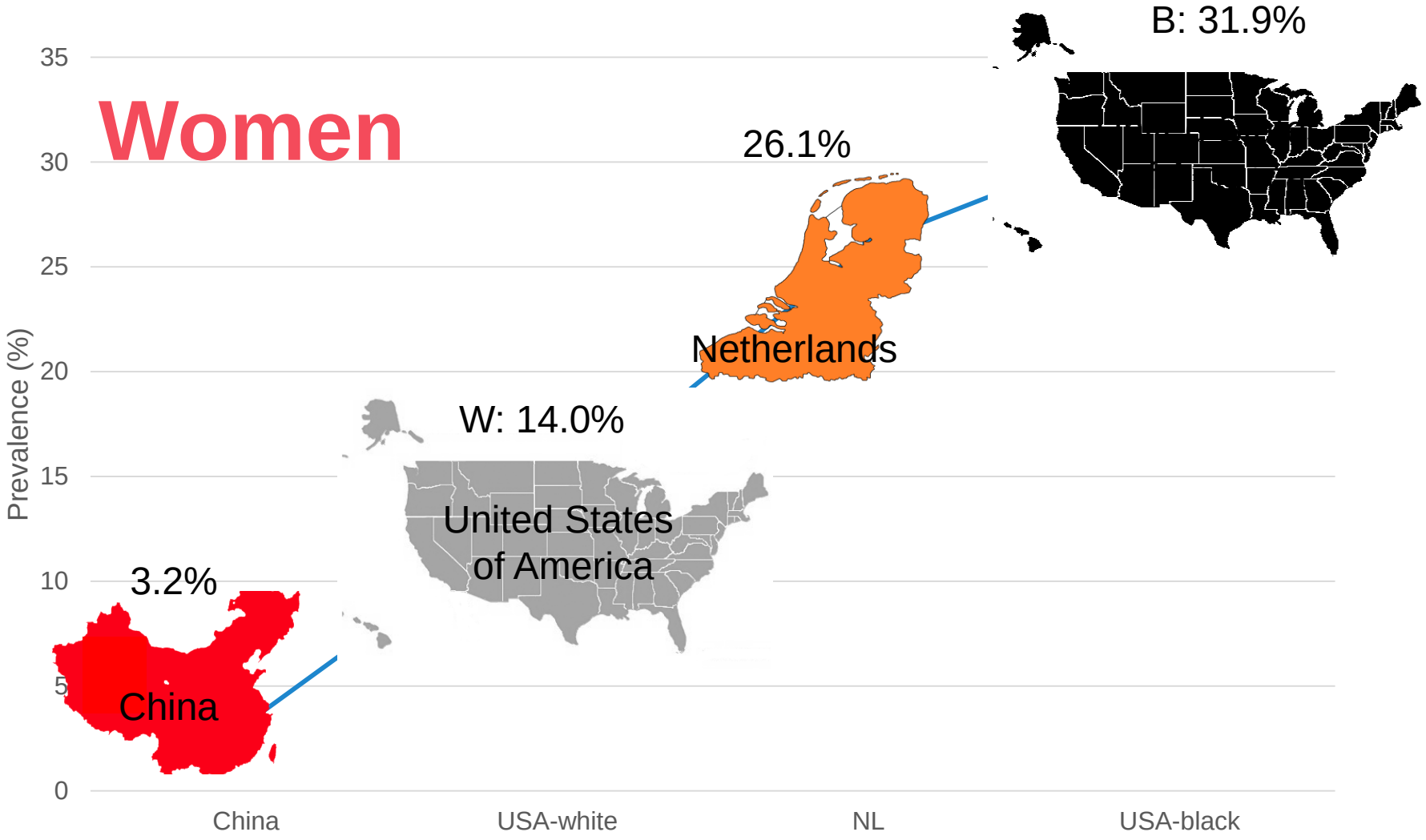


Prevalence of dynapenic obesity (by BMI)



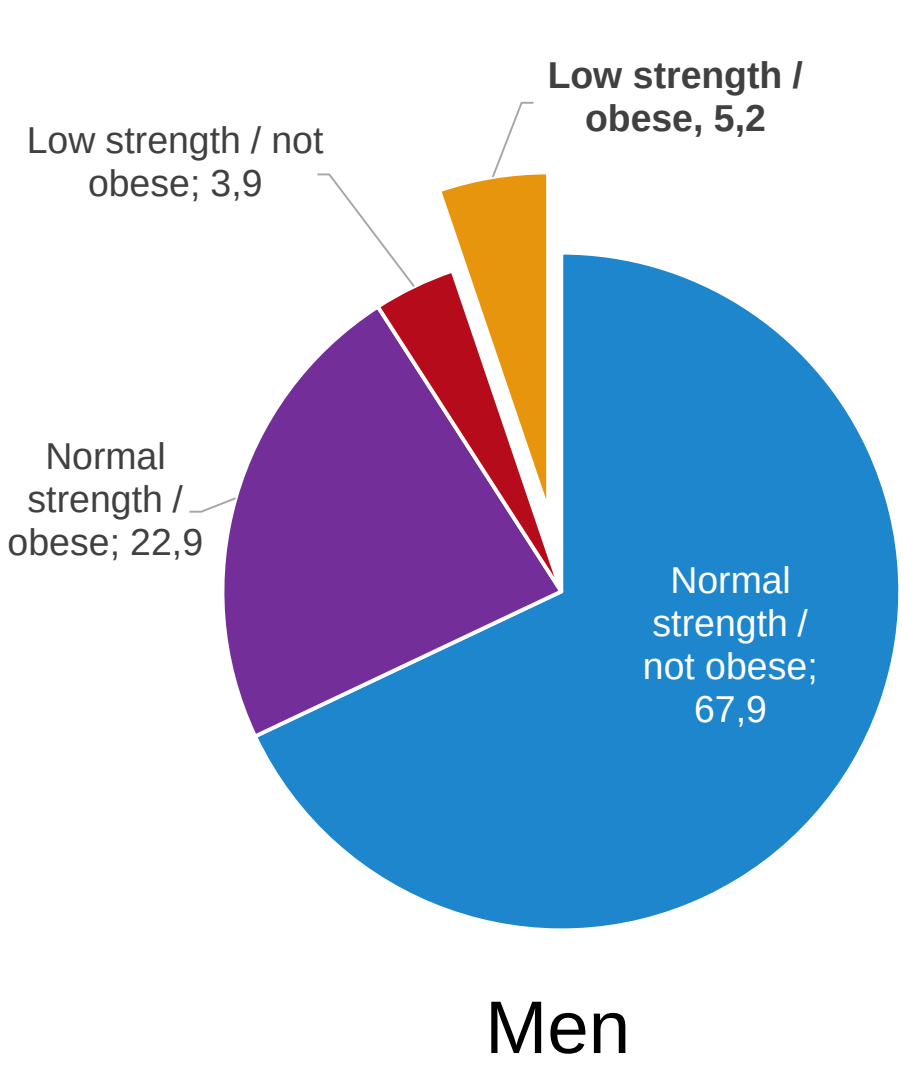
BMI>=30 considered obese in men and women

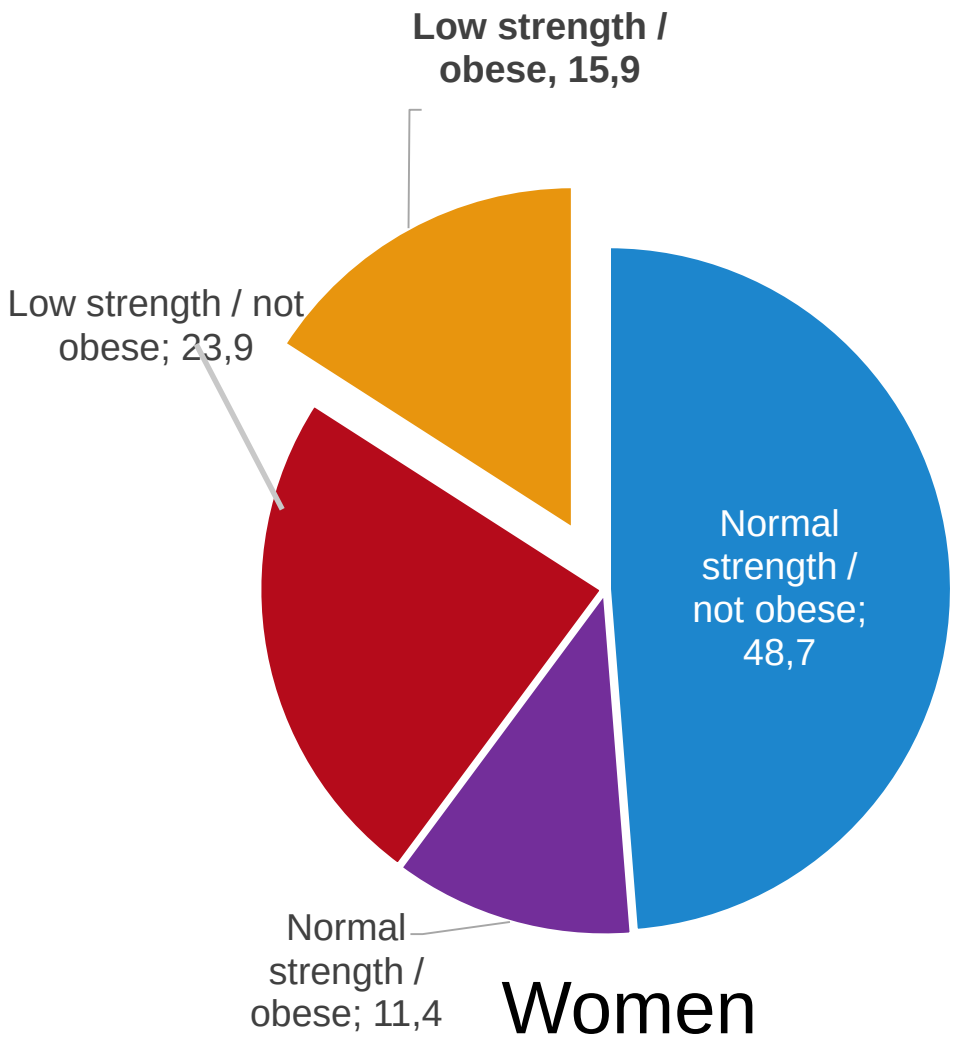
Prevalence of dynapenic obesity (by BMI)



BMI>=30 considered obese in men and women

Obesity (by %fat) & weakness

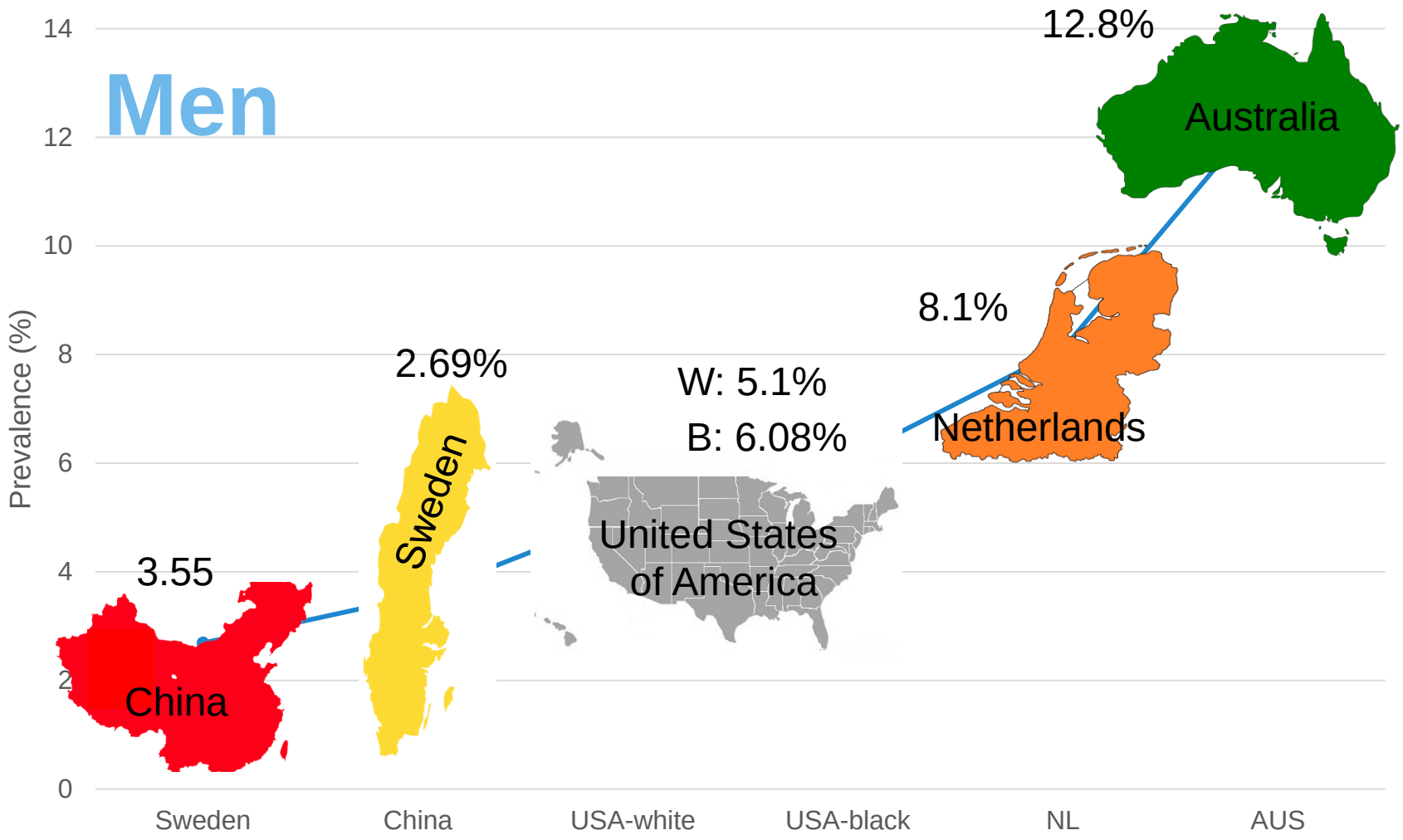




>=30% percent fat considered obese for men

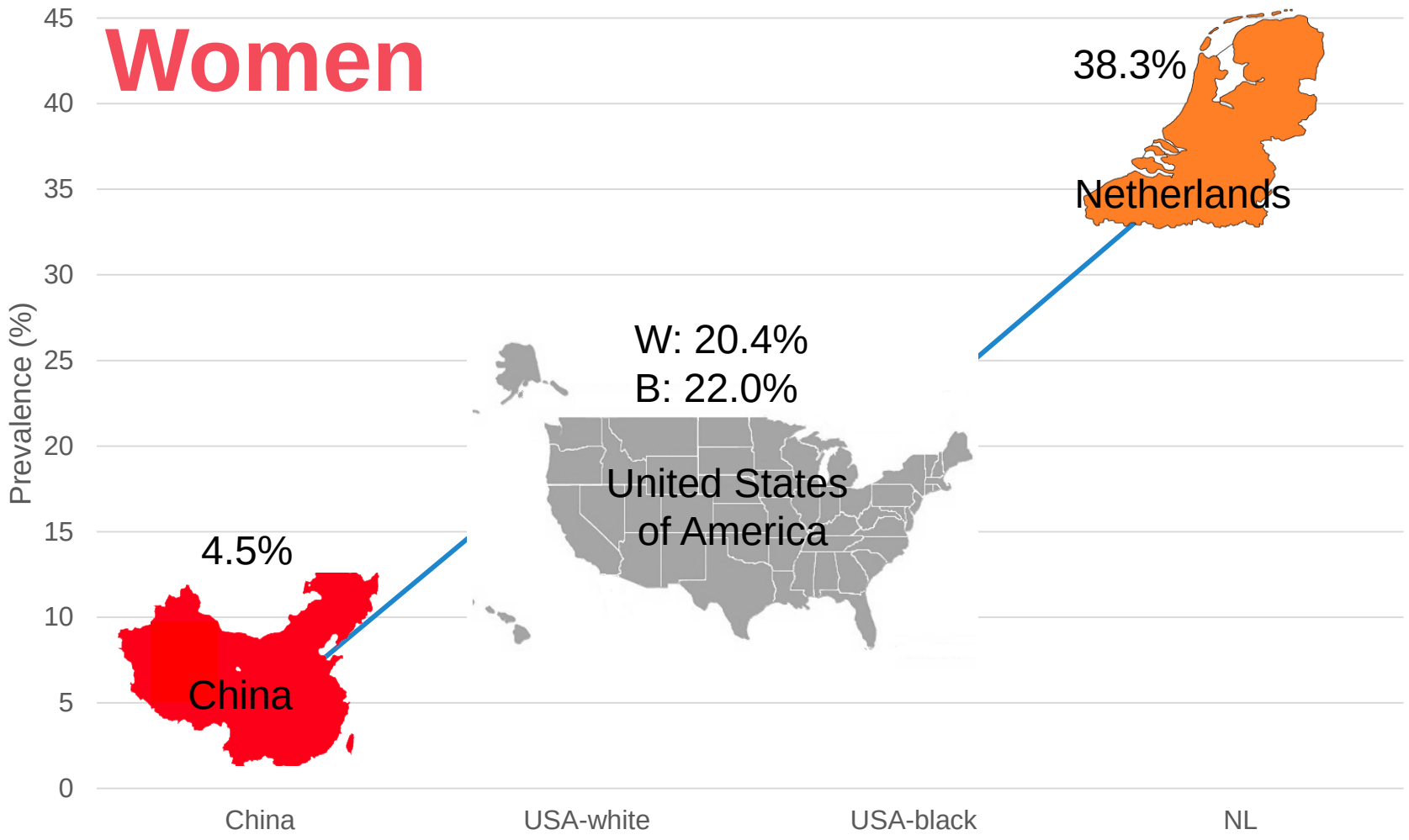
>=42% percent fat considered obese for women (Gallagher et al. 2000)

Prevalence of dynapenic obesity (by %fat)



>=30% percent fat considered obese for men (Gallagher et al. 2000)

Prevalence of dynapenic obesity (by %fat)



>=42% percent fat considered obese for women (Gallagher et al. 2000)

Objectives

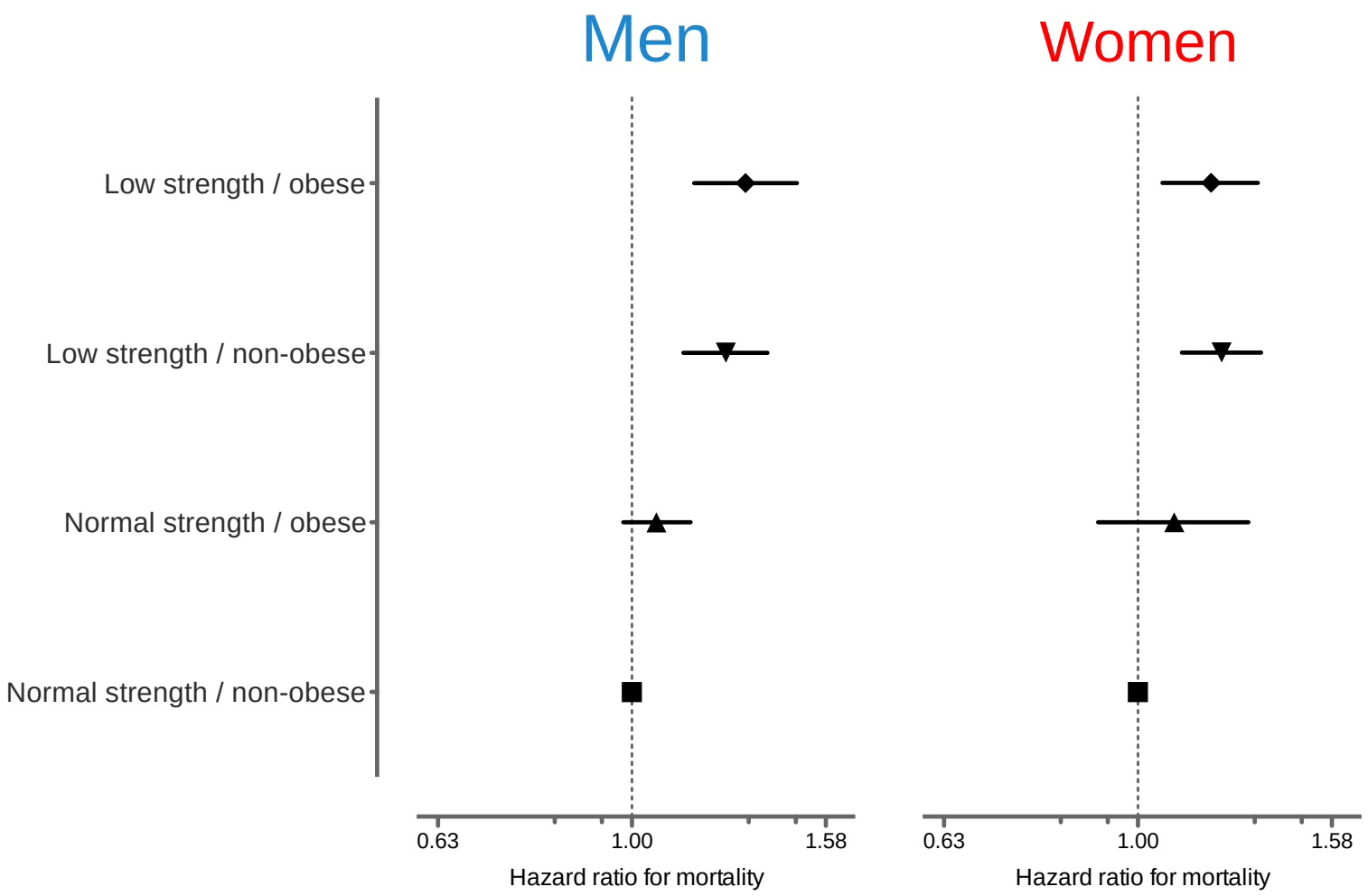
- To investigate differences in the association between obesity and muscle weakness according to new proposed criteria in a pooled sample of participants from four countries (US, Hong Kong, Australia and Sweden)

- To investigate the association between obesity with and without muscle weakness on health outcomes (mortality and falls) across a racially and regionally diverse sample of participants.

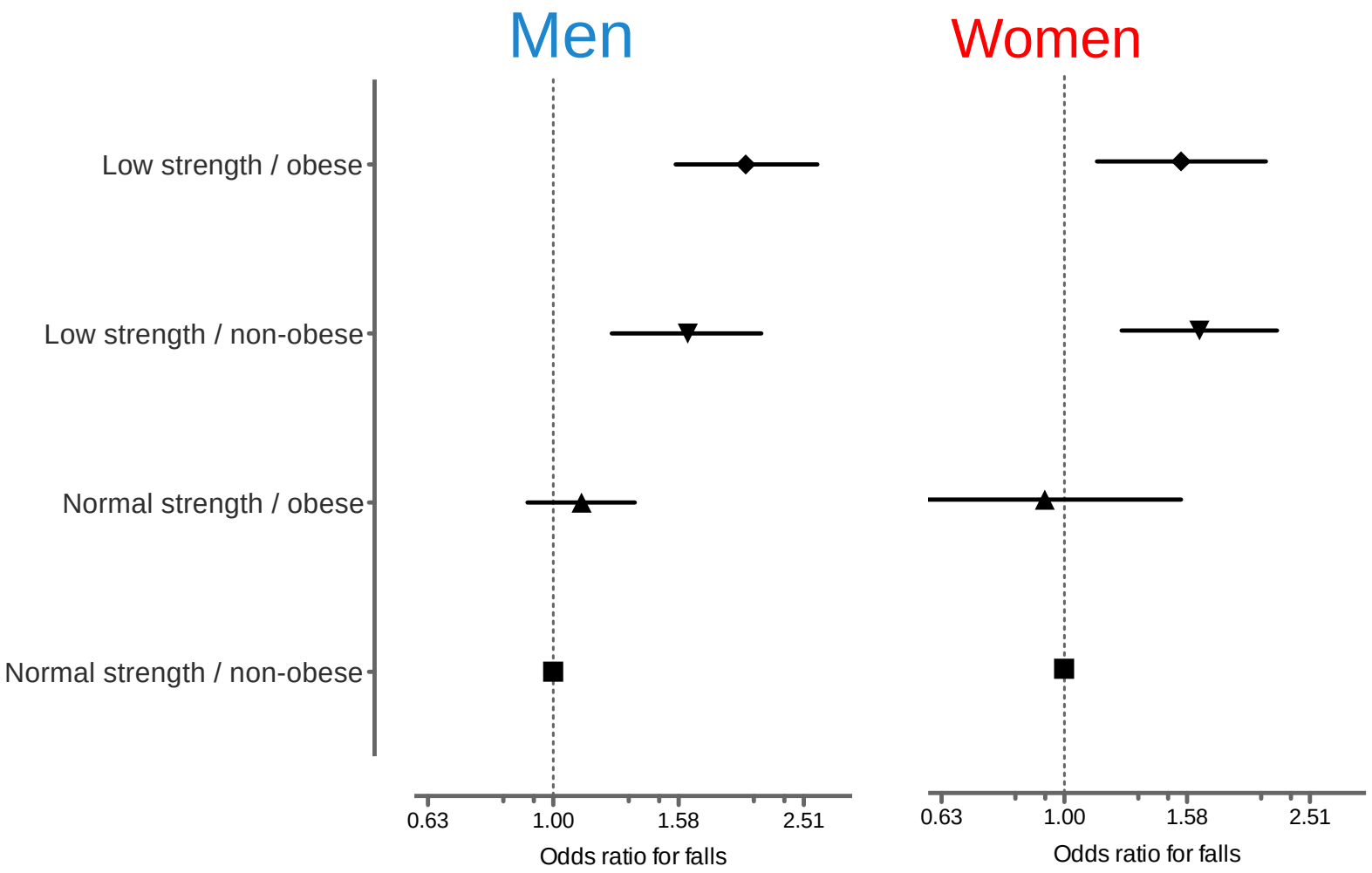
Mortality and fall outcomes

- Most cohorts have regular with participants to assess mortality
  - Men - Follow-up: 9.9 years
  - Women - Follow-up: 10.7 years
  - HR, 95% CI: proportional hazards adjusted for age
- Self-report every 4 to 6 months, analyzed as 2+ falls (vs. none) in the year after sarcopenia assessment
  - OR, 95% CI: logistic regression adjusted for age

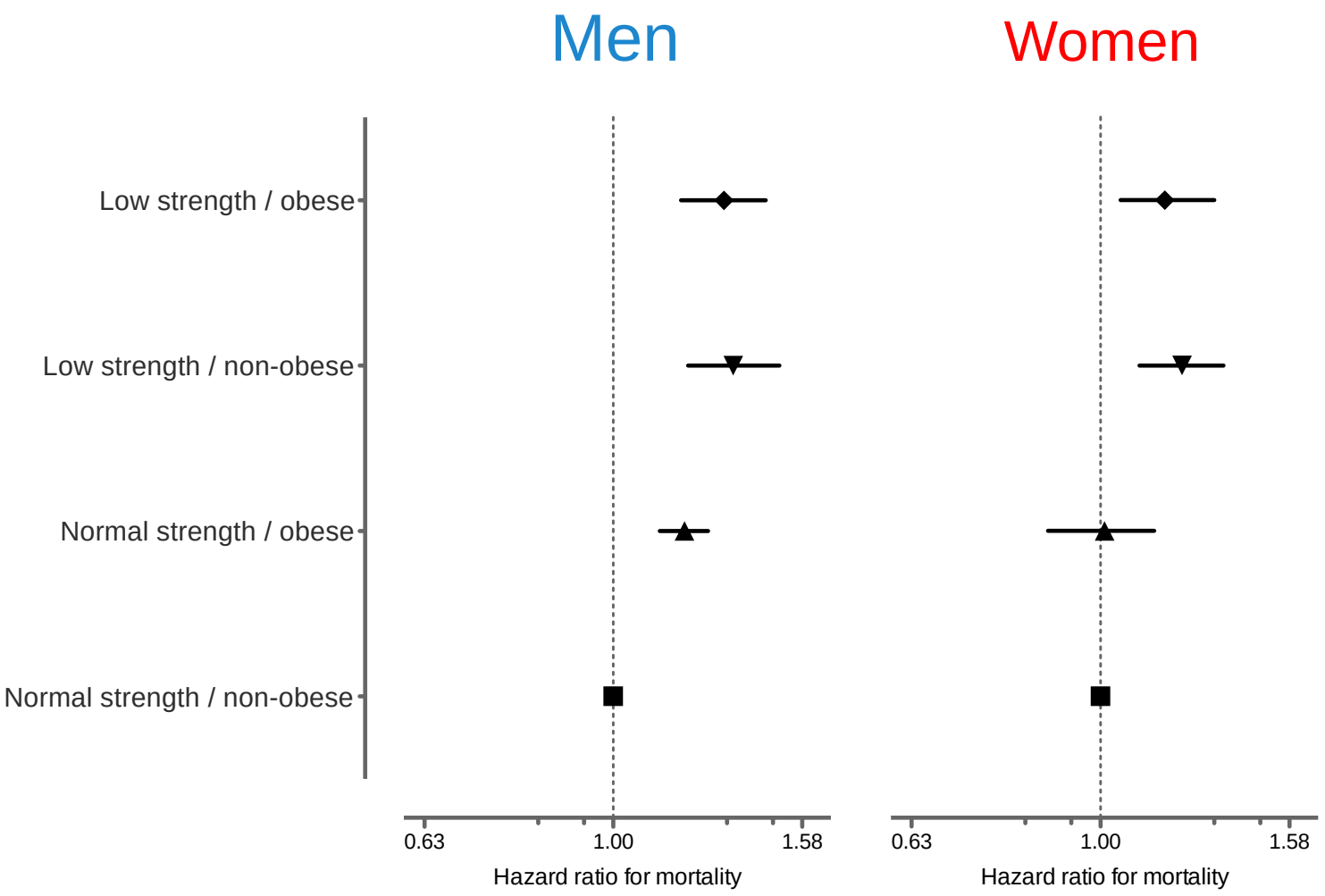
Dynapenic obesity (by BMI) & mortality



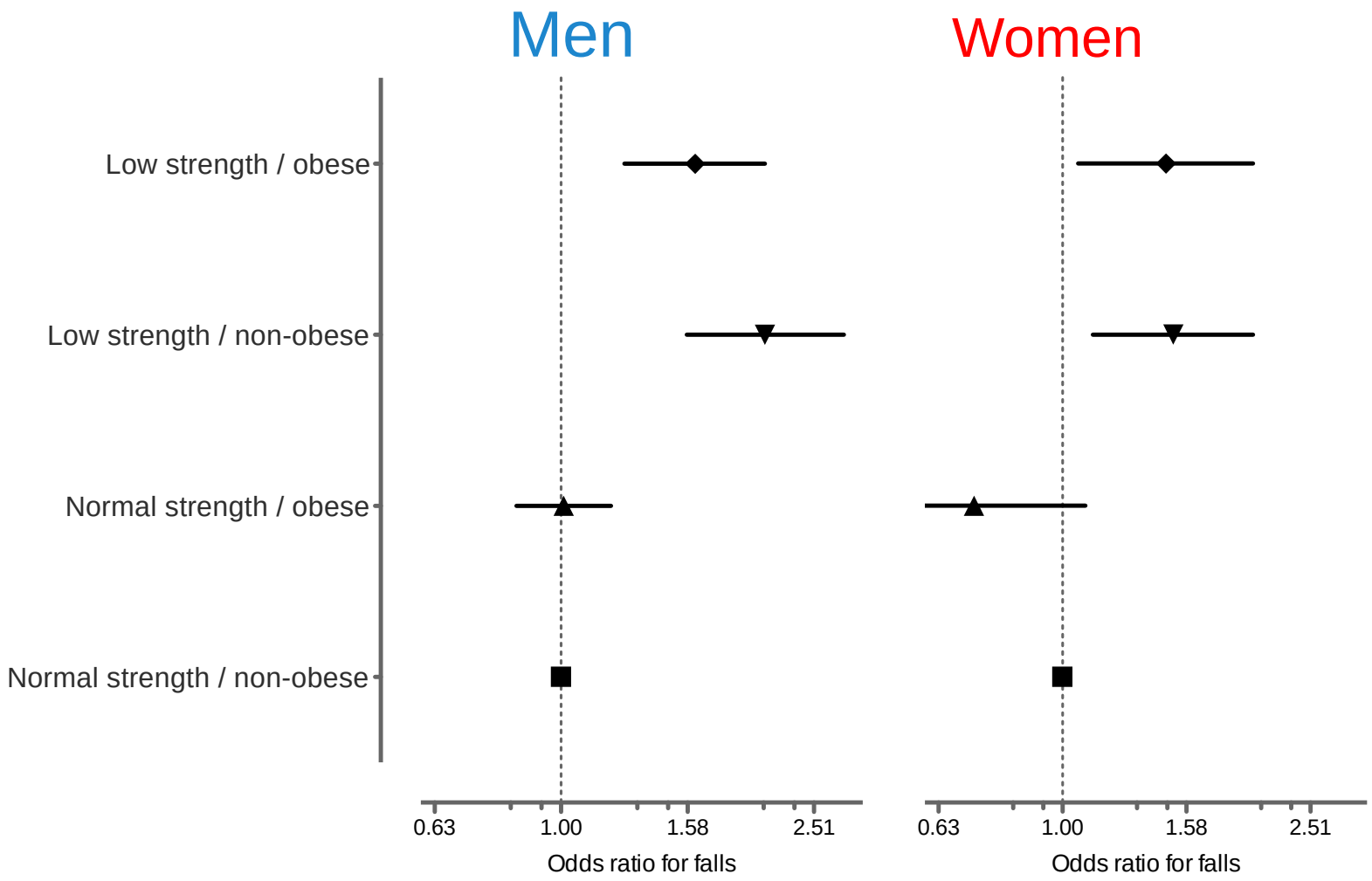
Dynapenic obesity (by BMI) & falls



Dynapenic obesity (by %fat) & mortality

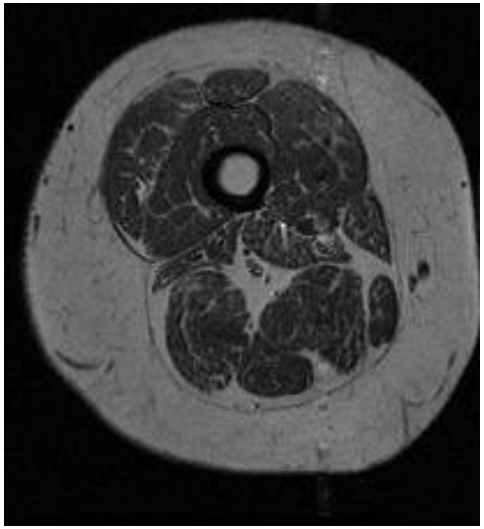


Dynapenic obesity (% fat) and falls



Overall conclusion

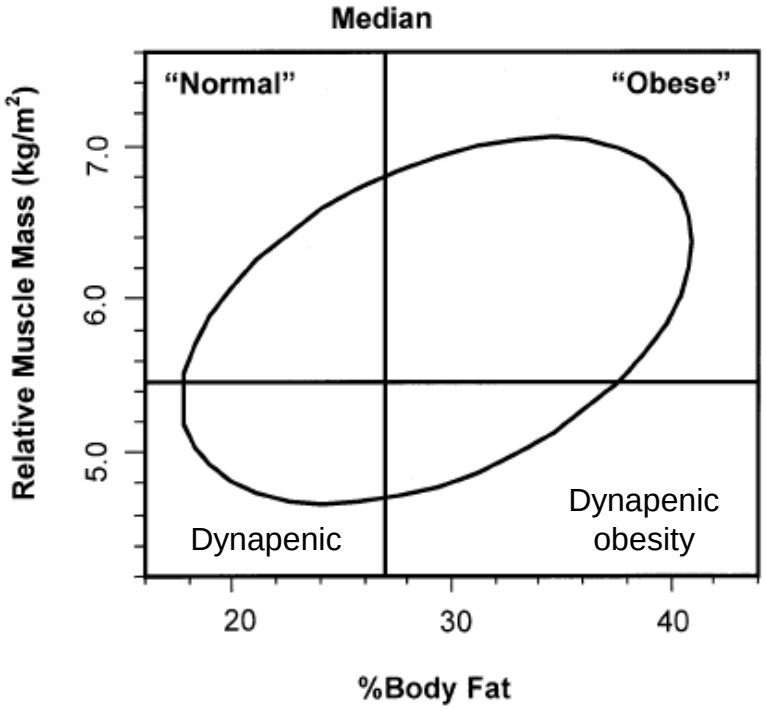
- The prevalence of dynapenic obesity:
  - Higher in women than men
  - Highest in Australian white males and US black females
  - Relatively similar trends between BMI and percent fat estimates of obesity



- Labeling individuals as dynapenic obese adds negligible information to predicting mortality and fall outcomes compared to dynapenia alone

Limitations

- Not all sarcopenia/dynapenia definitions evaluated
- Limited amount countries and races represented



- Sample sizes and gender distributions were different across countries

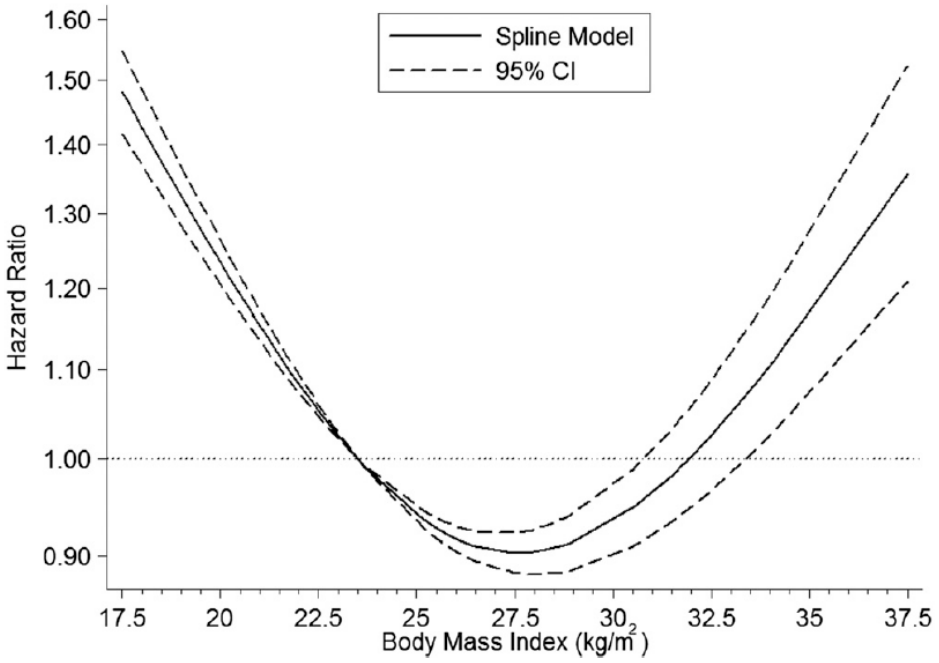
THANK YOU

- Funding sources
  - NIA: U01 AG051421
  - FNIH
- Funding from cohorts
  - Funding for cohort studies included in this presentation was provided by NIA, NIAMS, NINDS, NCATS, NHLBI, NIH Roadmap, Research Grants Council (Hong Kong), The Chinese University of Hong Kong, Swedish Research Council, the Swedish Foundation for Strategic Research, the ALF/LUA research grant in Gothenburg, the Lundberg Foundation, the Torsten and Ragnar Söderberg's Foundation, Petrus and Augusta Hedlunds Foundation, the Västra Götaland Foundation, the Göteborg Medical Society, the Novo Nordisk Foundation, National Health and Medical Research Council (Australia), Ageing and Alzheimer's Institute (Australia)
  - NIH grant and contract numbers: AG051421 , AG027810, AG042124, AG042139, AG042140, AG042143, AG042145, AG042168, AR066160, TR000128, AR049439-01A1, AG005407, AR35582, AR35583, AR35584, AG005394, AG027574, AG027576, N01AG62101, N01AG62103, N01AG62106, N01-HC- 85079, N01-HC-85080, N01-HC-85081, N01-HC-85082, N01-HC-85083, N01-HC-85084, N01-HC-85085, N01-HC-85086; N01-HC-35129, N01 HC-15103, N01 HC-55222, N01-HC-75150, N01-HC-45133, N01-HC-85239, HHSN268201200036C, HL080295, HL087652, HL105756, HL103612, AG023629, AG15928, AG20098, AG027058

EXTRA SLIDES

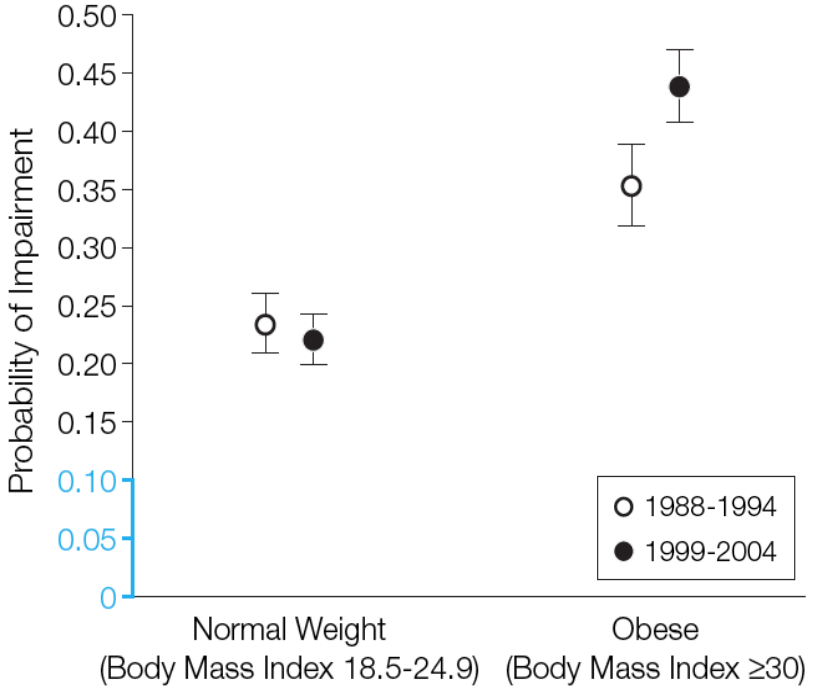
Obesity, mortality and functional health

All cause mortality >65 years



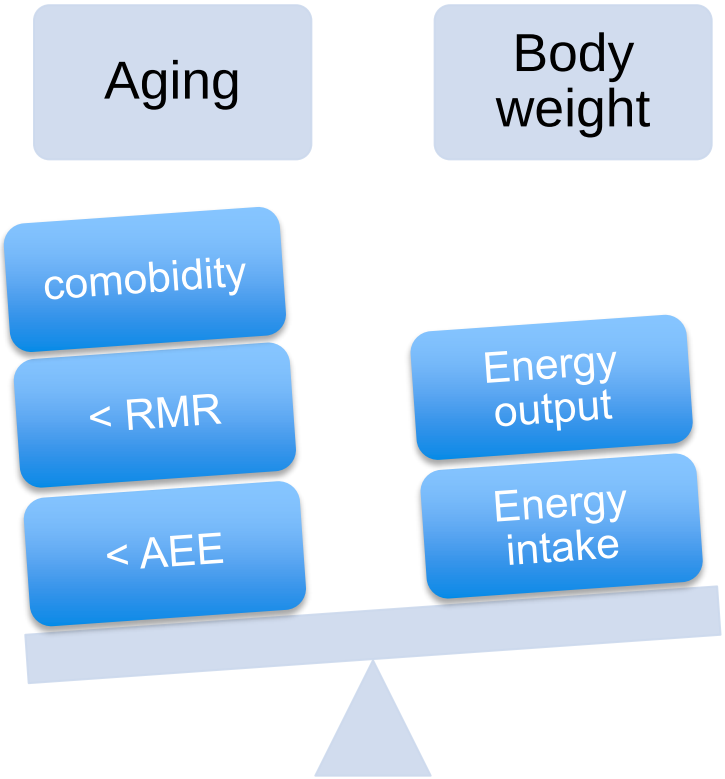
Winter et al. 2014

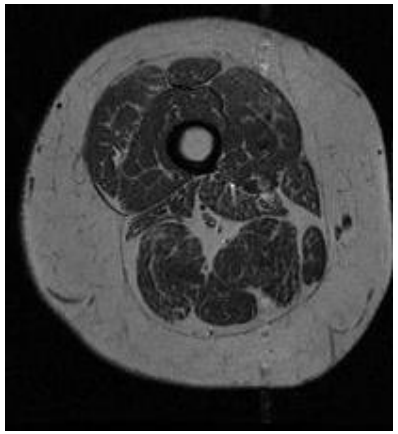
Physical impairment



Alley et al. 2007

Metabolic imbalance





Sarcopenic obesity

↑ Fat mass

↓ Lean mass
Strength

Functional limitation

Health event